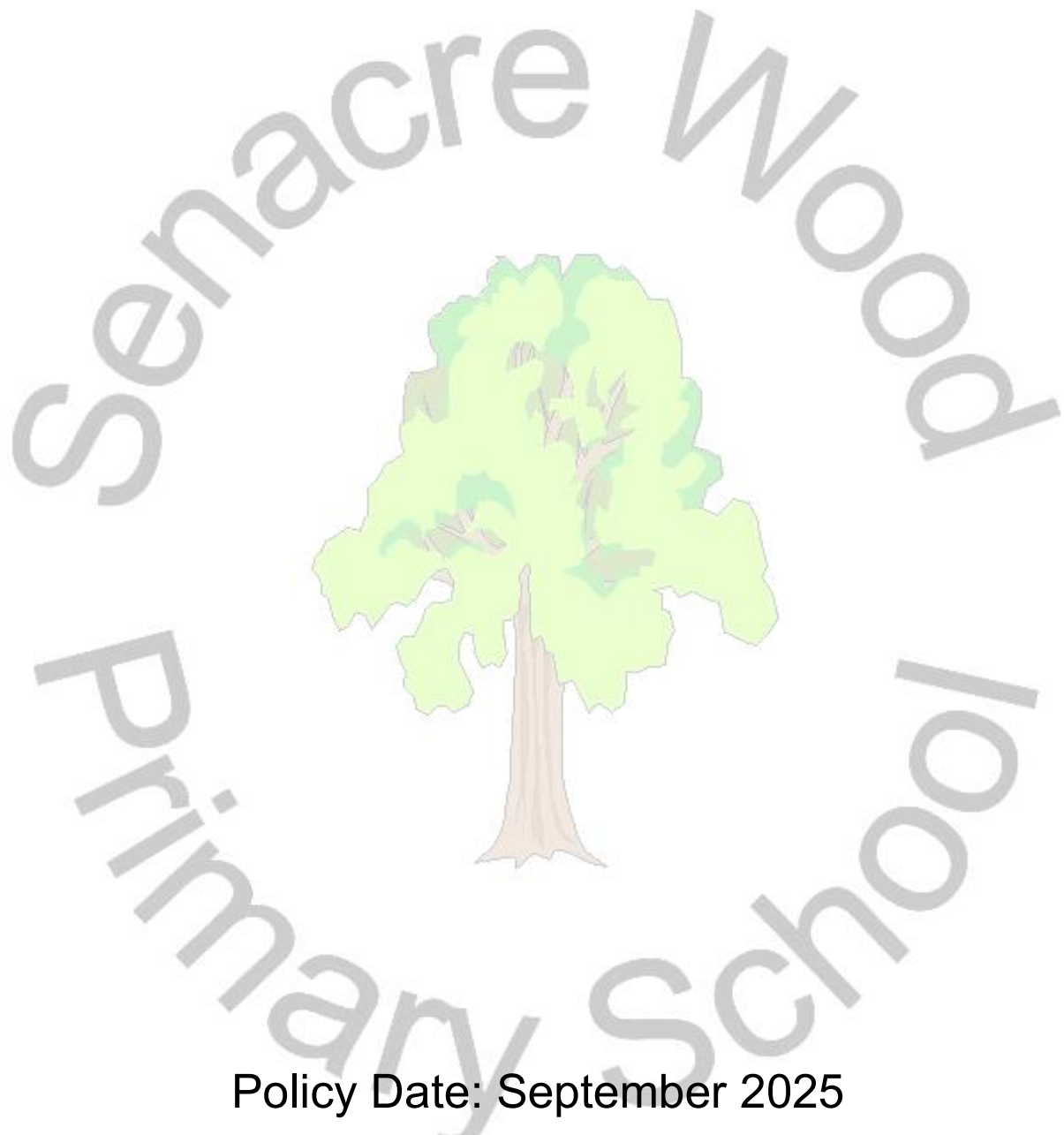


Mathematics Policy



Policy Date: September 2025
Review Date: September 2026

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Senacre Wood Primary School Mathematics Policy

INTRODUCTION

The National Curriculum states that:

“Mathematics is a creative and highly inter-connected 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.”

At Senacre Wood Primary school, we are committed to providing a high-quality mathematics education because we recognise that mathematics pervades all aspects of our lives and helps us to make sense of our world. We strive for all our pupils to be confident and competent mathematicians because we recognise that Mathematics is all around us.

INTENT

At Senacre Wood Primary, we follow the aims of the National Curriculum 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 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.*
- *Make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.*

National Curriculum 2014

Using the national curriculum for mathematics, and using a mastery approach to teaching maths, we aim to ensure that all pupils:

- Have a positive, resilient attitude towards maths where they are competent and confident to ‘have a go’.
- Have a good understanding of all strands of maths and how they are interconnected, as well as an appreciation of how maths contributes to daily life.
- Become fluent in the fundamentals of mathematics including number and arithmetic.
- Use mathematical vocabulary to concisely and confidently communicate, ask questions, reason and explain.
- Feel confident to stretch themselves and take risks in their learning

The core of what we believe is that your child should experience success and excitement in their maths so that they develop a confident, positive attitude. Building connected mathematical knowledge and the ability to retrieve, and apply this understanding, as well as the ability to apply school values, is fundamental to our ethos.

IMPLEMENTATION

PLANNING

At Senacre Wood Primary School, the National Curriculum aims have been mapped out for each year group (please see Maths Long Term Plans). Alongside this, we use White Rose Maths (WRM) to support planning. Long term plans are designed so that pupils learn the content in an order which supports their future learning. Through the structure of the Long-Term Plans, and using Maths Flashback tasks, pupils are also provided with opportunities to revisit and retrieve knowledge to enable them to build upon their understanding.

Within all planning, and throughout all strands of maths, it is important that children are allowed to explore maths and present their findings not only in a written form but also visually and verbally; to that end, the school have adopted the CPA approach: concrete, pictorial, abstract. As needed; to scaffold pupils' understanding, this method is incorporated into planning and teaching until pupils are ready to move on.

White Rose Maths provide teachers with exemplification for maths objectives which are broken down into the key aims of the National Curriculum- fluency, reasoning and problem solving. WRM support a mastery approach to teaching and learning and have number at their heart. It also supports the ideal of depth before breadth. Class teachers are also further supported using NCETM mastery documents and NCETM reasoning documents.

Within Key Stage One, pupils also receive a daily session of Fluency Bee which is a resource produced by WRM to support pupils with developing their Number Sense. Fluency Bee, *"Is a structured teaching programme designed to give children confidence with numbers through varied and frequent practice."* White Rose Maths.

LESSONS AND ENVIRONMENT

Where possible, all classes have a daily mathematics lesson. In key stage one lessons are 45-60 minutes and in key stage two they are generally 60 minutes. Across the school, Maths flashbacks are carefully used to support pupils with retrieving key skills to support their learning. It is vital that these are used effectively to retrieve information, to support the retention of ongoing key skills and retrieve information needed to access new learning, without overloading cognitive load.

The following are included in daily maths lessons:

- Learning objectives and, where appropriate, success criteria are clearly displayed and discussed.
- Opportunities for pupils to retrieve information (this could be from a previous lesson, unit or year group). By retrieving information, and using this to support new content, pupils can make conceptual links and, through retrieval, pupils are more likely to remember the information in the future.
- Carefully planned, modelled examples to develop conceptual and procedural knowledge; this includes varied fluency.
- Children should be encouraged to independently use manipulatives. To aid this, and in line with the recommendations of the Mainstream Core Standards, manipulatives should be clearly labelled and readily available to all pupils within the classroom. Where possible, this should be positioned closely with the maths working wall. To support teachers with choosing appropriate manipulatives, the benefits of different manipulates is outlined in [Appendix A](#).
- Opportunities for pupils to engage in mathematical discussions; this includes individual, paired, group and whole class learning and discussions.
- Opportunities to consolidate their understanding using varied fluency, reasoning and problem-solving activities.
- When appropriate knowledge and fluency have been secured, exposure to rich mathematical activities to broaden their understanding.
- Following the lesson, if children need further support, follow up feedback and interventions are provided.

Each classroom has a maths working wall. Maths working walls reflect the work completed during individual lessons and across a strand of work. The main purpose of a working wall is to support children in their current learning and enable independence. Where possible, they should be developed at the point of teaching. Within all maths displays, the following should be evident: overview of the unit, key vocabulary and worked examples of current learning. The working wall will also display key sentence stems, appropriate to the year group, to support pupils with forming sentences to show their reasoning within maths. During a lesson, teachers should interact with working walls to model how they can support pupils learning. At the end of a lesson, questions may be added which are designed to give opportunities for further practice or to deepen pupils understanding. When creating working walls, staff are considerate to the recommendations outlined in the mainstream core standards and ensure the working wall is accessible to all pupils.

Within a unit of work, pupils should also be provided with opportunities to complete games and 'open ended' reasoning tasks which promote problem solving, discussion and collaboration skills. These tasks should also be designed to deepen pupils understanding.

ONLINE RESOURCES

- Timetables Rock Stars (TTRS) is an online programme designed to boost the recall of tables. Pupils have access to this once they have started learning timetable facts in Year 2. The Sound check function is also used as a benchmark to support the assessment of pupils working towards achieving the Year 4 Multiplication Check.
- Numbots is used in EYFS, Key Stage One and for pupils working below Key Stage Two standard, to support pupils with understanding, recall and fluency in mental addition and subtraction, so that they can move from counting to calculating.

Pupils are provided with an individual log in to access these platforms at home and in school. During Celebration Assembly, pupils who have completed a stage in Numbots or improved their rock speed in TT Rockstars, will receive a certificate. Pupils who complete Diamond Stage or achieve Rock Legend status, will also receive an additional prize. Each term, there will also be an additional award for progress and effort across the term.

MARKING AND FEEDBACK

All children are entitled to regular and comprehensive feedback on their learning to enable them to become reflective learners and help them close the gap between current and expected performance. As far as possible, marking should be completed daily. As good practice, this should include live marking within the lesson; this could be completed as a whole class, in a small group or on a 1:1 basis. On occasion, it may be appropriate to have answers to problems available; this means that, after four or five calculations, pupils can check their answers themselves.

When marking is completed following the lesson, if strategies are incorrectly used, teachers should model the correct strategy and then set the child a correction or similar problem. During the marking process, it is important for teachers to distinguish between a pupil's simple slip and an error that reflects a lack of understanding. If errors demonstrate lack of understanding, the teacher may decide to take alternative courses of action such as targeted intervention or support prior to the following lesson or place the pupil in a focus group for the next lesson.

MATHS IN EARLY YEARS FOUNDATION STAGE

EYFS planning is based on the Development Matters statements and the Early Learning Goals (ELG). Within teacher directed tasks, child initiated and focused assessments, EYFS staff, continually observe and assess children against these, and plan the next steps in their mathematical development.

Teachers of EYFS ensure the children learn through a mixture of adult led activities and child-initiated activities both inside and outside of the classroom. EYFS staff use whole class input, split inputs and small group tasks to provide the focused input which pupils need at this young age. As Teacher Directed Maths is as active and hands on as possible, photos, questioning and observations are key to formative assessment. These are recorded in learning Journeys, assessment records (recorded in assessment folder) as well as Seesaw. To ensure pupils develop their understanding, they have regular opportunities to build on next steps in their play but also during 1:1 and focused intervention sessions.

As well as engaging in planned activities, throughout the day, easily accessible, quality mathematical resources are provided so that children can self-select and engage freely. Wherever possible, enquiry links and children's interests are used to support delivering the mathematics curriculum. When child-initiated activities are set up, maths resources, that will spark certain knowledge, are set up to ensure planned observations naturally arise in their play. This includes regular opportunities for pupils to develop their spatial reasoning including their understanding of shape, space and measure.

To further support pupils in choosing to complete activities linked with core subjects, EYFS use a rainbow challenge which includes a minimum of one maths-based task each week.

ASSESSMENT

Assessment is an integral part of teaching and learning and is a continuous process. To support this, teachers maintain an assessment grid (Maths Assessments Ladders) which tracks the children's progress and understanding across a range of assessment criteria objectives. This is updated regularly and is informed by retrieval tasks (in the form of maths flashbacks), tests, assessment questions, observations of pupils' discussions (these are recorded on pink and green slips) and work in children's books. Updated assessment grids can then be used to identify next steps and therefore inform planning of class tasks and interventions.

Each term, staff produce a comprehensive provision map which details the interventions to be completed in each class; these are targeted for pupils who may not be working on the appropriate year groups' programme of study or for pupils who may not have made the expected level of progress.

Data is submitted three times yearly and these are followed by Pupil Progress meetings. This process is used to identify pupils who are not making expected progress and discussions support the development of provision maps. To ensure consistency in levelling of pupils, the subject leader completes moderation of a cross section of pupils and supports with assessment questions which are appropriate to the year group.

EQUAL OPPORTUNITIES AND INCLUSION OF ALL LEARNERS

All children have equal access to the mathematics curriculum; to support this, staff follow the recommendations of the mainstream core standards. Positive attitudes towards mathematics are also encouraged, so that all children, regardless of race, gender, ability or special needs (including those for whom English is a second language) develop an enjoyment and confidence with mathematics.

Where required, children's EHCP's incorporate suitable objectives. These targets may be worked upon within the lesson (either in class, in a small group or 1:1) as well as on a 1:1 or small group basis outside the mathematics lesson.

Short term maths focused intervention in school helps children with gaps in their learning and mathematical understanding. These are delivered by trained support staff and overseen by the SENCO and/or the class teacher. Within the daily mathematics lesson, teachers have a responsibility to not only use adaptive teaching techniques to support children with SEND but also activities that provide sufficient challenge for children who

are high achievers. It is the teachers' responsibility to ensure that all children are challenged at a level appropriate to their ability.

For a small number of pupils, who may be struggling with fundamental core skills of maths, Numberstacks may be used to support them with mastering the foundations of the number system. Numberstacks provides focused assessment and teaching to support pupils with the key skills needed to understand place value, addition, subtraction, multiplication and division.

IMPACT

To ensure we measure impact, we gather a variety of data and feedback to check whether learning has been retained. The information gathered impacts the future planning of teaching and learning opportunities, ensuring we are responsive to the needs of our learners. Formal pupil progress meetings are held 3 times a year. During this process, progress is measured within the year group as well as from benchmark assessments (e.g. ELG or End of Key Stage One).

The following are methods also used to support measuring the impact of maths teaching across the school:

- Formative assessments; through regular retrieval and application, we can check children's retention of previously taught concepts.
- Summative assessments-
 - Short summative assessments which are based on previous units of work. These are used to update pupils' levels and gaps are used to inform interventions and focus for retrieval practice.
 - EYFS- Baseline and end of Year assessment against Early Learning Goals.
 - Key Stage Two, end of Key Stage SATs assessments.
 - Year 4 Multiplication Screening check.

ROLE OF THE MATHS SUBJECT LEADER

It is the role of the subject leader, along with SLT, to ensure the subject is monitored using a range of methods which inform the development of mathematics teaching and learning. Following monitoring, outcomes are shared, with colleagues and relevant stakeholders, in a timely manner and areas for improvement are swiftly and effectively acted upon.

It is also the role of the maths subject leader to:

- Promote the value and importance of mathematics amongst staff and pupils.
- Identify and support the training needs of colleagues.
- Moderate teachers' assessment to ensure consistency with levels across year groups.
- Monitor, maintain and provide high quality resources and manipulatives.
- Ensure pupils' voice is valued and responded to.
- Keep up to date with developments in the area of mathematics.

APPENDIX A- MATHS MANIPULATIVES

Benefits as outlined by White Rose Maths calculation policies.

NUMBER SHAPES SUCH AS NUMICON (*ALL FOUR NUMBER OPERATIONS*)

Number shapes, such as Numicon, can be useful to support children to subitise numbers as well as explore aggregation, partitioning and number bonds. When adding numbers, children can see how the parts come together making a whole. As children use number shapes more often, they can start to subitise the total due to their familiarity with the shape of each number. When subtracting numbers, children can start with the whole and then place one of the parts on top of the whole to see what part is missing. Again, children will start to be able to subitise the part that is missing due to their familiarity with the shapes. Children can also work systematically to find number bonds.

Number shapes also support children's understanding of multiplication as repeated addition. Children can build multiplications in a row using the number shapes. When using odd numbers, encourage children to interlock the shapes so there are no gaps in the row. They can then use the tens number shapes along with other necessary shapes over the top of the row to check the total. Using the number shapes in multiplication can support children in discovering patterns of multiplication. When dividing, number shapes support children's understanding of division as grouping. Children make the number they are dividing and then place the number shape they are dividing by over the top of the number to find how many groups of the number there are altogether.

CUBES (*ADDITION AND SUBTRACTION*)

Cubes can be useful to support children with the addition and subtraction of one-digit numbers. When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole. When subtracting numbers, children can start with the whole and then remove the number of cubes that they are subtracting in order to find the answer. This model of subtraction is reduction, or take away. Cubes can also be useful to look at subtraction as difference. Here, both numbers are made and then lined up to find the difference between the numbers. ***It is important to remember that cubes are useful when working with smaller numbers but are less efficient with larger numbers as they are difficult to subitise and children may miscount them.***

TENS FRAME (*ADDITION AND SUBTRACTION*)

When adding and subtracting within 10, the ten frame can support children to understand the different structures of addition and subtraction. Using the language of parts and wholes represented by objects on the ten frame introduces children to aggregation and partitioning. Aggregation is a form of addition where parts are combined together to make a whole. Partitioning is a form of subtraction where the whole is split into parts. Using these structures, the ten frame can enable children to find all the number bonds for a number. Children can also use ten frames to look at augmentation (increasing a number) and take-away (decreasing a number). This can be introduced through a first, then, now structure which shows the change in the number in the 'then' stage. This can be put into a story structure to help children understand the change e.g. First, there were 7 cars. Then, 3 cars left. Now, there are 4 cars.

When adding two single digits, children can make each number on separate ten frames before moving part of one number to make 10 on one of the ten frames. This supports children to see how they have partitioned one of the numbers to make 10, and makes links to effective mental methods of addition. When subtracting a one-digit number from a two-digit number, firstly make the larger number on 2 ten frames. Remove the smaller number, thinking carefully about how you have partitioned the number to make 10, this supports mental methods of subtraction. When adding three single-digit numbers, children can make each number on 3 separate 10 frames before considering which order to add the numbers in. They may be able to find a number bond to 10 which makes the calculation easier. Once again, the ten frames support the link to effective mental methods of addition as well as the importance of commutativity.

BEAD STRINGS (ALL FOUR NUMBER OPERATIONS)

Different sizes of bead strings can support children at different stages of addition and subtraction. Bead strings to 10 are very effective at helping children to investigate number bonds up to 10. They can help children to systematically find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into. Bead strings to 20 work in a similar way but they also group the beads in fives.

Bead strings to 100 can support children in their understanding of multiplication as repeated addition. Children can build the multiplication using the beads. The colour of beads supports children in seeing how many groups of 10 they have, to calculate the total more efficiently. Encourage children to count in multiples as they build the number e.g. 4, 8, 12, 16, 20. Children can also use the bead string to count forwards and backwards in multiples, moving the beads as they count. When dividing, children build the number they are dividing and then group the beads into the number they are dividing and the count how many groups they have made.

REKENREK (ADDITION, SUBTRACTION AND ROUNDING)

Rekenreks are manipulatives used to build number sense and number relationships in the EYFS and KS1 classroom. Within school, we have Rekenreks can be used to support the understanding of early place value and number sense. Pupils need to be able to understand that they don't necessarily need to count every bead. As a rekenrek has the two different colours, it can be easy for pupils to visualise numbers and relate them to five or ten. Rekenreks can also be used to recognise number bonds. It can also be used to support addition and subtraction which do not involve number bonds. A rekenrek can be used as a visual learning resource to support with rounding. The fact that there are 5 white beads and 5 red beads on each row helps to show pupils which way they should round a number and supports their understanding of why.

NUMBER TRACKS AND NUMBER LINES (ALL FOUR OPERATIONS)

Number tracks are useful to support children in their understanding of augmentation and reduction. When adding, children count on to find the total of the numbers. On a number track, children can place a counter on the starting number and then count on to find the total. When subtracting, children count back to find their answer. They start at the minuend and then take away the subtrahend to find the difference between the numbers. Building on from this, pupils move onto using number lines. Children can start by counting on or back in ones, up or down the number line. Progressing further, children can add numbers by jumping to the nearest 10 and then jumping to the total. This links to the making 10 method which can also be supported by ten frames. The smaller number is partitioned to support children to make a number bond to 10 and to then add on the remaining part. Children can subtract numbers by firstly jumping to the nearest 10. Again, this can be supported by ten frames so children can see how they partition the smaller number into the two separate jumps.

Number tracks and number lines are useful to support children to count in multiples, forwards and backwards. Moving counters or cubes along the number track can support children to keep track of their counting. Translucent counters help children to see the number they have landed on whilst counting. When multiplying, children place their counter on 0 to start and then count on to find the product of the numbers. When dividing, children place their counter on the number they are dividing and the count back in jumps of the number they are dividing by until they reach 0. Children record how many jumps they have made to find the answer to the division. ***It is important to note that number tracks can be useful with smaller multiples but when reaching larger numbers they can become less efficient.***

BASE 10/DIENES (ALL FOUR NUMBER OPERATIONS)

Using Base 10 or Dienes is an effective way to support children's understanding of column addition, subtraction, multiplication and division with smaller numbers. For all calculations, it is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model. For addition and subtraction, children should first add or subtract without an exchange before moving on to questions with an exchange. For subtraction, when building the model, children should just make the minuend using Base 10, they then subtract the subtrahend. Highlight this difference to addition to avoid errors by making both numbers. For division, children can share the Base 10/ Dienes between different groups e.g. by drawing circles or by rows on a place value grid. When they are sharing, children start with the larger place value and work from left to right. If there are any left in a column, they exchange. When recording, encourage children to use the part-whole model so they can consider how the number has been partitioned in order to divide. This will support them with mental methods.

PLACE VALUE COUNTERS (ALL FOUR NUMBER OPERATIONS)

For larger numbers, pupils should use place value counters in a similar way to base 10. It is again important that pupils write the formal written calculation beside the model.

