

# Southwick Community Primary School



## Mathematics Policy 2020-2021

Reviewed September 2021

## Introduction

This calculation policy has been written to ensure that it more than meets the requirements of the National Curriculum and embeds the developmental milestones within the Essentials Curriculum. It aims to support and guide staff in their teaching of mathematics for ALL children throughout the school. It provides practical examples of how skills can be embedded and taught alongside the terminology to be introduced.

## Our vision for maths at Southwick:

In our school we promote children's curiosity and enable them to safely risk take and learn from first-hand experiences. Our primary focus is to support the children to become fluent in mathematical understanding from the most basic level so that they can build upon their own understanding. We enable our children to develop conceptual understanding, recall of number facts and patterns and apply their knowledge rapidly and accurately. We promote children's ability to reason through opportunities to discuss their thinking and understanding. This emphasis may result in less written work at times but will result in a much deeper understanding. We promote problem solving and solution finding. This is not only true in mathematical learning but in almost all aspects of school life. We support children to make progress at their own pace of learning. Often misconceptions cause greater difficulties at a later stage of learning. We will promote smaller group learning opportunities whenever possible and appropriate, and ensure children revisit their thinking so they are secure in their understanding and able to move confidently on to next steps and challenges.

## Our school aims:

- Children are confident and competent towards their understanding of place value.
- An ethos of overlearning and reinforcement is embedded within all numeracy teaching.
- Mathematical concepts are applied in a variety of contexts.
- Children enjoy their maths lessons and a love of maths is instilled within all learners.
- Joined up approaches linking mathematical thinking to other curriculum areas are encouraged where possible.
- Children are to explore, investigate and problem solve, embedding their understanding and skills within all mathematical areas.
- Children build upon and strengthen their understanding and use of mathematical vocabulary through daily teaching.
- Classrooms are engaging and supporting providing age/ability appropriate visual aids.
- Classroom resources are clearly labelled and accessible for children, encouraging independence and ownership.
- A clear CPA approach is embedded into our daily teaching. Children need to use concrete resources before they progress to pictorial and abstract representations.
- As new methods of calculations are introduced, children should have the opportunity to examine them, alongside the method they have consolidated, to make connections between the methods and establish the similarities and differences between them.
- An understanding of the important concepts and an ability to make connections within mathematics.
- A focus on developing fluency to recall number facts and the number system.
- The ability to show initiative in solving problems in a wide range of contexts, including the new or unusual.
- The ability to think independently and to persevere when faced with challenges, showing a confidence of success.
- The ability to embrace the value of learning from mistakes and false starts.
- The ability to reason, generalise and make sense of solutions.
- Fluency in performing written and mental calculations and mathematical techniques.

### Provision at Southwick:

Children are provided with a variety of opportunities to develop and extend their Mathematical skills, including:

- Group work
- Paired work
- Whole class teaching
- Individual work including 1:1 support where needed or intervention work when identified

Children engage in:

- the development of mental strategies
- written methods
- practical work
- investigational work
- problem solving
- mathematical discussion
- consolidation of basic skills and number facts

Teaching approaches:

- Teachers plan problem solving and investigational activities every week to ensure that children develop the skills of mathematical thinking and enquiry.
- A CPA approach is to be embedded throughout the school ensuring children have full understanding or a taught skill.



- Consolidation grids are to be completed at least once a week (See Appendix) following whole school proforma.
- To provide adequate time for developing mathematics, maths is taught daily and discretely. Maths lessons may vary in length but will usually last for about 30 minutes in EYFS and at least 1 hour in Key Stage 1 and Key Stage 2.

At Southwick lessons can include:

- Both teaching input and pupil activities.
- Opportunities to take learning outdoors and pride children with real mathematical experiences through visits and visitors.
- A balance between whole class, guided grouped and independent work, (groups, pairs and individual work)
- Effectively differentiated activities/objectives and appropriate challenge.
- Sometimes the focus for the session is new learning, at other times children may be practising, to master the application of a concept they have learned earlier. The focus of the session may vary for different children depending on their learning needs.
- Teachers plan learning that is differentiated to meet the needs of all children, whether they have a specific learning difficulty in maths or whether they are particularly able.
- Teachers endeavour to differentiate learning appropriately for high attaining, middle attaining and low attaining children – possibly with individual work for an SEN pupil at one end of the achievement spectrum, to individual work for a gifted pupil at the other.

### Resources and classroom environment:

- Classrooms must be engaging and support children's age/ability group with a range of visual aids.
- Classroom resources must be clearly labelled and accessible for children, encouraging independence and ownership.
- In the classrooms a range of concrete and pictorial apparatus are to be available to support children to grasp concepts.
- Appropriate mathematical vocabulary should be displayed clearly.
- There should be maths work on display in classrooms and in other areas of the school in order to encourage a positive attitude and enthusiasm towards mathematics for all groups of children.

- From Year 2 onwards classrooms must offer visual support for times tables reflecting needs of learners taught.

#### Inclusive practice at Southwick:

- Daily mathematics lessons must be inclusive to ALL children with special educational needs and disabilities.
- References must be made to individual learners SEN support plans and PLP's and support strategies must be evident within daily planning.
- Pebbles must be used to track learners working below Milestone 1.
- For children with fine motor difficulties larger squared books are provided for children to record work.
- Specific targets may be worked upon within the lesson as well as on a 1:1/ small group intervention basis outside the mathematics lesson.
- Within the daily mathematics lesson, teachers have a responsibility to not only provide differentiated activities 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.

#### Equal opportunities at Southwick:

Southwick is committed to ensuring the active participation and progress of all children in their learning. All children will be given equal opportunities to achieve their best possible standard, whatever their current attainment and irrespective of gender, ethnic, social or cultural background, home language or any other aspect that could affect their participation or the progress of which they are capable.

#### Planning:

- All maths planning must be completed on the school proforma.
- Planning must include opportunities for daily mental maths sessions.
- Planning must have clear success criteria and objectives.
- Planning must follow the ethos of the school and excite learners in their maths lessons.
- Planning can be linked to topic where applicable and it is encouraged for cross-curricular opportunities to be planned for.
- Planning files must be readily available for any maths moderation.

#### Designing a maths lesson:

Lesson content needs to be carefully sequenced in order to develop a coherent and comprehensive conceptual pathway through the mathematics. Learning should be broken down into small, connected steps, building from what Children already know. Difficult points and potential misconceptions need to be identified in advance and strategies to address them planned. Key questions are to be planned, to challenge thinking and develop learning for all Children. Contexts and representations must be carefully chosen to develop reasoning skills and to help pupil's link concrete ideas to abstract mathematical concepts. The use of high quality materials and tasks to support learning and provide access to the mathematics, is integrated into lessons.

#### Features of teaching maths:

The main 'teaching' part of the lesson need to be short but intense. Time must be spent working on practice and intervention. Lessons are to be sharply focused and key new learning points are identified explicitly. There is regular interchange between concrete/contextual ideas and their abstract/symbolic representation. Making comparisons is an important feature of developing deep knowledge. The questions "What's the same, what's different?" are often used to draw attention to essential features of concepts. Repetition of key ideas, often in the form of whole class recitation, is used frequently. This helps to verbalise and embed mathematical ideas and provides Children with a shared language to think about and communicate mathematics. Teacher-led discussion is interspersed with short tasks involving pupil to pupil discussion and completion of short activities. Gaps in Children' knowledge and understanding are identified early by in-class questioning and by reviewing learning as pre assessment. Potential misconceptions are addressed rapidly through individual or small group intervention, quickly and effectively, separate from the main mathematics lesson, to ensure all Children are ready for the next lesson. Teachers discuss their mathematics teaching regularly with colleagues, sharing teaching ideas and classroom experience.

#### Records of Children work:

- Children are taught a variety of methods for recording their work and they are encouraged and helped to use the most appropriate and efficient method of recording.
- Use of photographs is used as a means of recording, as appropriate.
- Children are encouraged to master new concepts and methods as exemplified within the calculation policy.

- Children will be given the opportunity to communicate their mathematics in a variety of ways e.g. pictorial, through use of charts...
- In Key Stage 2 it is desirable for children to write the learning objective of each lesson and the day's date for all pieces of work. In KS1 and EYFS stickers will be used to clearly display learning objectives.

### Marking and Presentations:

Please refer to whole school marking policy for clear information on marking mathematical books.

### Monitoring and evaluations:

Monitoring of children's progress is to be continually moderated throughout the academic year. This monitoring happens through examination of work in books, pupil interviews, analysis of assessment results and the assessments used. Following monitoring activities feedback is given to staff about how they can strengthen their practice and CPD (professional development) opportunities built in where it would be deemed valuable. These might take the shape of inputs during staff meetings or by a variety of other means. Opportunities will be available throughout the year for staff to share practise and embed a consistent approach in school. Observations of practice will occur throughout school ensuring a consistent approach is undertaken and the ethos of maths in Southwick is embedded within daily teaching. During staff performance management sessions, staff will be asked to explain and discuss in depth their children's current academic levels, barriers to learning and next steps.

### Role of subject lead

- To lead in the development of mathematics throughout the school
- To monitor the planning, teaching and learning of mathematics throughout the school
- To help raise standards in mathematics
- To provide teachers with support in the teaching of mathematics
- To provide staff with CPD opportunities in relation to mathematics within the confines of the budget and the School Improvement Plan
- To monitor and maintain high quality resources
- To keep up to date with new developments in the area of mathematics

### Reasoning at Southwick

At Southwick we believe in a high-quality mathematics education which 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. All staff are expected to include where possible reasoning questions throughout a unit of work and at least one lesson a week with a focus on mathematical reasoning.

5 steps to reasoning:

**Step one:** Describing: simply tells what they did.

**Step two:** Explaining: offers some reasons for what they did. These may or may not be correct. The argument may yet not hang together coherently. This is the beginning of inductive reasoning.

**Step three:** Convincing: confident that their chain of reasoning is right and may use words such as, 'I reckon' or 'without doubt'. The underlying mathematical argument may or may not be accurate yet is likely to have more coherence and completeness than the explaining stage. This is called inductive reasoning.

**Step four:** Justifying: a correct logical argument that has a complete chain of reasoning to it and uses words such as 'because', 'therefore', 'and so', 'that leads to' ...

**Step five:** Proving: a watertight argument that is mathematically sound, often based on generalisations and underlying structure. This is also called deductive reasoning.

### Mental Maths at Southwick

Mental maths sessions must be taught, practised and consolidated daily for each year group (minimum of 15 mins). Mental Maths sessions should give children a range of practical opportunities to develop fluency in key skills and the ability to recall and apply knowledge rapidly and accurately. Consolidation grids are used as a whole school model to introduce and recall previous taught knowledge during mental maths sessions.

## Times Tables Expectations

The quick recall of multiplication and division facts (times tables) is essential for all children. The ability to recall these facts quickly enables children to answer related questions with ease. It is therefore important that we approach the teaching and testing of times tables in a similar and progressive format from Year 2 to Year 6.

According to the new National Curriculum 2014 the expectation of times tables in each Year Group is as follows:

Year 2: 2x, 5x, 10x

Year 3: 3x, 4x, 8x

Year 4: 6x, 7x, 9x, 11x, 12x

Year 5: All x and ÷ facts (12x12)

Year 6: All x and ÷ facts (12x12) and related language/symbols e.g. % and square root

Times tables must be recalled and taught in daily mental maths sessions.

## Breadth of study:

The Essentials Curriculum provides a breadth of study throughout the key stages, highlighting the fundamental teaching aspects within our maths curriculum.

<u>Key Stage 1</u>	<u>Key Stage 2</u>
<ul style="list-style-type: none"> <li>• Count and calculate in a range of practical contexts.</li> <li>• Use and apply mathematics in everyday activities and across the curriculum.</li> <li>• Repeat key concepts in many different practical ways to secure retention.</li> <li>• Explore numbers and place value up to at least 100.</li> <li>• Add and subtract using mental and formal written methods in practical contexts.</li> <li>• Multiply and divide using mental and formal written methods in practical contexts.</li> <li>• Explore the properties of shapes.</li> <li>• Use language to describe position, direction and movement.</li> <li>• Use and apply in practical contexts a range of measures, including time.</li> <li>• Handle data in practical contexts.</li> </ul>	<ul style="list-style-type: none"> <li>• Count and calculate in increasingly complex contexts, including those that cannot be experienced first hand.</li> <li>• Rigorously apply mathematical knowledge across the curriculum, in particular in science, technology and computing.</li> <li>• Deepen conceptual understanding of mathematics by frequent repetition and extension of key concepts in a range of engaging and purposeful contexts.</li> <li>• Explore numbers and place value so as to read and understand the value of all numbers.</li> <li>• Add and subtract using efficient mental and formal written methods.</li> <li>• Multiply and divide using efficient mental and formal written methods.</li> <li>• Use the properties of shapes and angles in increasingly complex and practical contexts, including in construction and engineering contexts.</li> <li>• Describe position, direction and movement in increasingly precise ways.</li> <li>• Use and apply measures to increasingly complex contexts.</li> <li>• Gather, organise and interrogate data.</li> <li>• Understand the practical value of using algebra.</li> </ul>

## EYFS Breadth of study:

<u>Number Early Learning Goal</u>	<u>Shape, Space and Measure Early Learning Goal</u>
-----------------------------------	---

<ul style="list-style-type: none"> <li>• Children count reliably with numbers from one to 20.</li> <li>• Place numbers in order to 20</li> <li>• Say which number is one more than a number to 20</li> <li>• Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.</li> <li>• They solve problems, including doubling, halving and sharing.</li> </ul>	<ul style="list-style-type: none"> <li>• Use everyday language to talk about size</li> <li>• Use everyday language to talk about weight</li> <li>• Use everyday language to talk about capacity</li> <li>• Use everyday language to talk about position</li> <li>• Use everyday language to talk about distance</li> <li>• Use everyday language to talk about time</li> <li>• Use everyday language to talk about money</li> <li>• Compare quantities and object to solve problems.</li> <li>• They recognise, create and describe patterns.</li> <li>• They explore characteristics of everyday objects and shapes and use mathematical language to describe them.</li> </ul>
--	---

**Threshold concepts:**

Children are to be explicitly taught each threshold concept within each academic year, allowing learners to reinforce and build on prior knowledge.

<b>Know and use numbers</b>	This concept involves understanding the number system and how they are used in a wide variety of mathematical ways.
<b>Add and subtract</b>	This concept involves understanding both the concepts and processes of addition and subtraction.
<b>Multiply and divide</b>	This concept involves understanding both the concepts and processes of multiplication and division.
<b>Use fractions</b>	This concept involves understanding the concept of part and whole and ways of calculating using it.
<b>Understand the properties of shapes</b>	This concept involves recognising the names and properties of geometric shapes and angles.
<b>Describe position, direction and movement</b>	This concept involves recognising various types of mathematical movements.
<b>Use measures</b>	This concept involves becoming familiar with a range of measures, devices used for measuring and calculations
<b>Use statistics</b>	This concept involves interpreting, manipulating and presenting data in various ways
<b>Use algebra</b>	This concept involves recognising mathematical properties and relationships using symbolic representations.