



# SHAP ENDOWED CHURCH OF ENGLAND PRIMARY

## Maths Policy

**2023 - 2024**

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<b>Date:</b>	Spring 2024
<b>Proposed review date<sup>2</sup>:</b>	Spring 2025

## REVIEW SHEET

The information in the table below details earlier versions of this document with a brief description of each review and how to distinguish amendments made since the previous version date (if any).

Version Number	Version Description	Date of Revision
1	Original	April 2022
2	Reviewed and updated to include: <ul style="list-style-type: none"> <li>• NCETM materials</li> <li>• Mastering Number Programme for EYFS / KS1</li> <li>• Refinements to TTRS procedures</li> </ul>	January 2024



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## **Introduction**

This document is a statement of the vision, aims, strategies and outcomes for the teaching and learning of mathematics at Shap Endowed Church of England Primary School. This document provides a clear and agreed framework for the teaching of mathematics in our school and promotes continuity and coherence across the school, allowing all children to achieve their full potential in mathematics. Mathematics is a core subject and this policy has been written in accordance with the statutory requirements as set out in the Primary National Curriculum.

‘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 (Department for Education, 2014).

This policy should be read in conjunction with the school’s calculation policy.

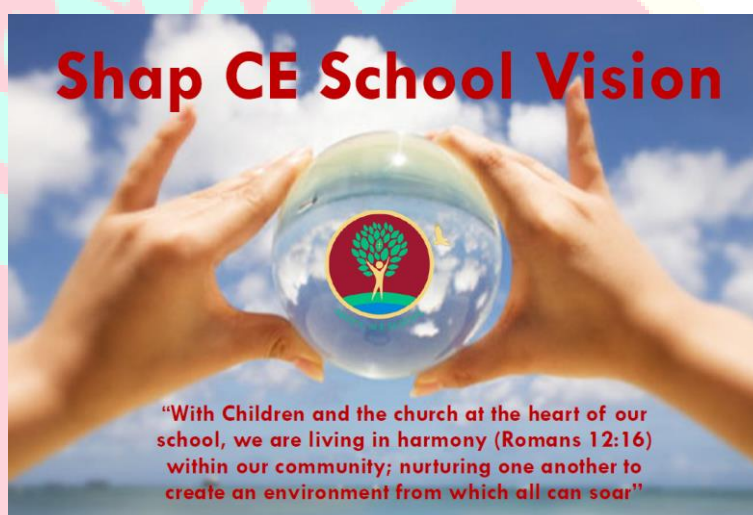


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## Intent

At Shap School, we believe that all children are mathematicians.

We want our children to be confident and positive mathematicians and we aim to develop a sense of enjoyment and curiosity about the subject. We provide a maths curriculum that stimulates, challenges and explores links with the wider world and equips children with skills for life. To achieve this, we use a mastery approach in the teaching and learning of maths. Mastery is achieved through exploration, clarification, practice and application over time. A mathematical concept or skill has been mastered when a child can represent it in multiple ways, has the mathematical language to communicate related ideas and can independently apply the concept to new problems in unfamiliar contexts. At each stage of learning, children are encouraged to develop a deep, conceptual and sophisticated understanding of the topic that they build on as they move up through the school or at the appropriate stage; building solid foundations from which children can soar in maths.

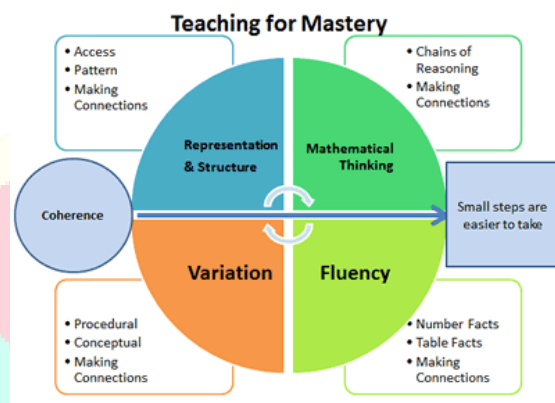


Our vision and intent for mathematics at Shap CE Primary School is in congruence with the aims of the 2014 Primary National Curriculum for maths (DfE, 2014):

- Children will 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.
- Children will reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- Children 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.
- Children should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.
- Children should also apply their mathematical knowledge to science and other subjects.
- Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

## Implementation

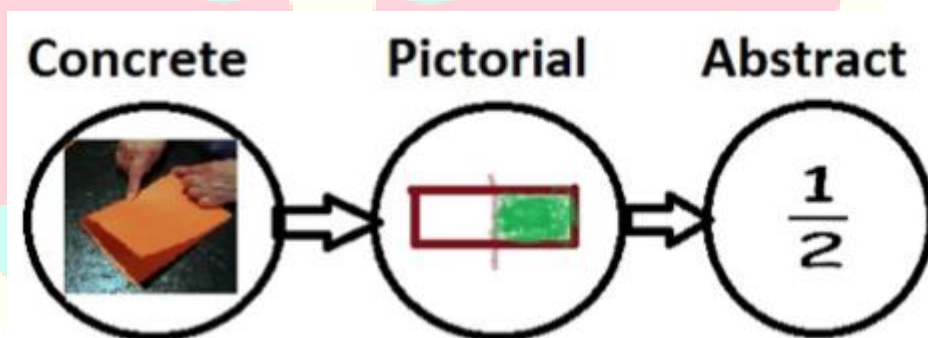
At Shap we offer children a broad maths curriculum with teaching underpinned by a mastery approach. A typical maths lesson provides the opportunity for all children, regardless of their ability, to develop and flourish into confident and capable mathematicians through the use of teaching for mastery strategies.



## Teaching for Mastery Approach

The teaching and learning of mathematics at Shap Endowed Church of England Primary School should include aspects of the following mathematics mastery strategies in every lesson and/or over a series of lessons.

### **Concrete - Pictorial - Abstract**



The CPA approach is not new. It has its roots in the theory of educational psychologist Bruner. Bruner (1964, 2006) theorised that learning begins with an action or experience (enactive) which was then translated into images of the experience (iconic). The number of iconic representations grew equivalently with the amount of actions or experiences, until links begin to be formed to connect some of the representations into a collective structure. This structure is then indicated with an abstract symbol (symbolic). The idea that learning needs to begin with a concrete action or experience is also shared by a number of other authoritative educational theorists (Piaget ; Dienes, 1971; Ginsburg & Opper, 1988; Wadsworth, 1984).

For the most effective mathematical learning to take place, children need to constantly go back and forth between each of the stages with the stages being taught simultaneously. This ensures concepts are reinforced and understood (Johnson, 2022).

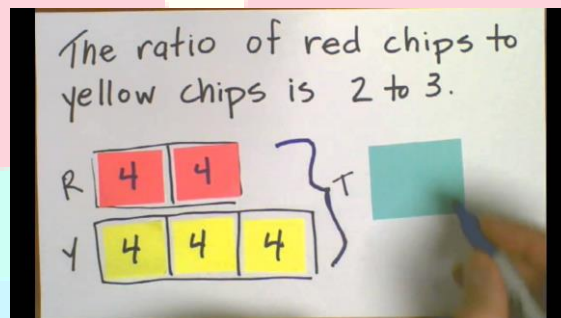
**Concrete**

The abstract nature of maths can be confusing for children, but through the use of concrete materials they are able to 'see' and make sense of what is actually happening. New concepts are introduced through the use of physical objects or practical equipment. These manipulatives can be physically handled, enabling children to explore new and different mathematical concepts; this is the "doing" stage.

Concrete resources can be used in a great variety of ways with children at every level of maths learning. All children, regardless of ability, benefit from the use of practical resources in ensuring understanding goes beyond the learning of a procedure. Practical resources promote reasoning and discussion, enabling children to articulate and explain a concept. Teachers are also able to observe the children to gain a greater understanding of where misconceptions lie and to establish the depth of their understanding.

**Pictorial**

Pictorial is the "seeing" stage. Here, children use representations of the objects they used in the concrete stage to model procedures and problems. This stage encourages children to connect the physical and abstract by drawing pictures, circles, diagrams or models which represent the objects in a problem. Without this stage, children can find visualising a problem difficult.

**Abstract**

In this stage, children use symbols to represent problems. This stage is only used on it's own once children have a solid understanding using the concrete and pictorial stage.

$$6y = 5y + 5$$

## **The Five Big Ideas**

The NCETM, through their research, have developed 5 core strategies that should be utilised when teaching for maths mastery (NCETM, 2017). In our maths lessons at Shap, teachers routinely use some, or all, of these teaching for maths mastery strategies in their daily lessons.

### ***Coherence***

Lessons are broken down into small, connected steps that gradually unfold the concept and provides access for all children. These small steps will lead to a generalisation of the concept and the ability to apply the concept to a range of contexts.

At Shap, teachers use small steps from the White Rose Maths resources to plan a coherent series of lessons to break down large concepts in manageable and meaningful steps.

### ***Fluency***

Fluency comes from deep knowledge, repetition and practise.

When children are fluent in a concept they are able to: rapidly recall key facts such as times tables and number bonds and procedures to calculate and solve questions; have greater accuracy when completing calculations with few or no careless errors; retention of knowledge and understanding on a separate occasion to when the concept was first introduced (for example, in a different week, month, term or year); have the flexibility to move between different contexts and representations of mathematics.

At Shap, fluency is a part of all lessons, either in the starter activity (discussed later in the policy) or in the main part of the lesson. We give children regular practice and repetition activities to develop fluency with a particular focus on number including: rapid recall of times tables, number bonds and mental calculations appropriate to each year group. Fluency tasks will be given in lessons or as early morning work and can take the form of: chanting, mental arithmetic tests, Learn Its and CLICs taken from Big Maths, whole class or group games.

### ***Representation and Structure***

Representations (CPA) used in lessons expose the mathematical structure being taught. The representation needs to pull out the concept being taught, and in particular, the key difficulties or misconceptions children might encounter. There will be some key representations which the children will meet time and again.

At Shap, teachers will plan and use the CPA approach across some, or all, of their lessons allowing children to see the mathematical structure behind a concept. Teachers have access to a range of concrete manipulatives as well as interactive visual, pictorial representations to use with children in lessons. Teachers will also use stem sentences, where appropriate, which describes the representation and helps the children move to working in the abstract.

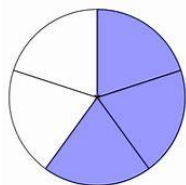
### ***Mathematical Thinking and Talking***

If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others.

Mathematical thinking can involve: looking for pattern in order to discern structure; looking for relationships and connecting ideas; reasoning logically, explaining, conjecturing and proving.

Mathematical thinking is expressed through talking. A maths classroom should never be a quiet

classroom. To encourage mathematical talking, teachers may use stem sentences to help children structure their talk. For example:



*The denominator is \_\_\_ because the whole has divided into \_\_\_ equal parts.*

*The numerator is \_\_\_ because \_\_\_ equal parts have been shaded.*

The denominator is 5 because the whole has been divided into 5 equal parts.

The numerator is 3 because 3 equal parts have been shaded.

Teachers will also give children sentence scaffolds to enable them to express their ideas. Some examples are:

- It can't be... because...
- I noticed that...
- This is true/false because...
- I already know that ... so ...
- This is always/never true because...
- This is the same/different because...
- If... then...

Children should be able to explain how they gained an answer and express why they know it is the right answer. This mathematical talk is the foundation for reasoning skills and will build children's confidence to communicate their ideas clearly and concisely before writing them down.

At Shap, teachers will scaffold and facilitate mathematical thinking through targeted and differentiated questioning. We ask children to explain, convince, draw diagrams to illustrate an idea or strategy. Teachers provide regular, purposeful opportunities for mathematical talk, including:

- Show me how to...
- Teach your friend to...
- How do you know...?
- Why have you chosen...?
- How else can you represent...?
- What have you learnt?
- Convince me..
- Sometimes, always, never?
- True or false? Why?

Teachers model the correct use of mathematical vocabulary and expect children to use the correct age-appropriate vocabulary in lessons too. Teachers have access to the correct mathematical vocabulary through the White Rose planning and from mathematical glossaries for each year group saved on the school network in Global.



**Variation**

Variation is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.

At Shap, we use variation in lessons by using CPA representations simultaneously when teaching a procedure or concept. Children will have access to these representations and concrete manipulatives in their classroom. Variation is also used in the questions given to children in their practice of a concept, tackling the same concept or procedure through different types and structures of questions.



## Planning

### **Long Term Planning**

At Shap, teachers follow White Rose Maths planning. White Rose Maths resources, the National Curriculum for Mathematics, 2014 and the Early Years Foundation Stage Profile, 2022, have been used to create a long term, yearly overview of maths. This long-term plan, for each year group, ensures correct coverage and time allowance to achieve the depth necessary to 'master' each concept.

### **Medium Term Planning**

All year groups from EYFS to Year 6 use the White Rose or the NCETM (National Centre for Excellence in the Teaching of Mathematics) curriculum prioritisation planning for their medium-term plans.

These schemes provide teachers with exemplification for the national curriculum maths objectives for each year group broken down into small steps to provide coherence which supports a mastery approach. Each block also contains the key mathematical vocabulary and sentence stems for mathematical thinking as well as examples of fluency, reasoning and problem-solving questions for each step.

### **Short Term Planning**

Teachers prepare and plan their own short-term planning incorporating the 'small steps' from the White Rose plans or NCETM materials and using the mastery strategies as listed above. Teachers are free to use the planning style that suits them either using a planning format or through PowerPoint or Smart Boards. Teachers are also encouraged to use a variety of resources to compliment and enhance their lessons. Teachers have the flexibility to choose resources that they feel will be most effective to support the needs of individual learners in their class. Some examples of additional resources teachers use are listed below:

- Concrete manipulatives found in classrooms and the shared maths cupboard
- White Rose Maths premium resources
- Maths on Target textbooks
- NCETM mastery materials
- Convince Me reasoning cards
- NRich problem solving website
- Maths Aids website
- My Mini Maths website

## Lesson Structure

Teachers are encouraged to use their own pedagogical knowledge and creativity to plan and deliver maths lessons incorporating the teaching for mastery strategies detailed above. Lessons using the mastery approach are engaging, stimulating and will ensure all children make progress from their starting points.

However, to target the development of children's retention, long-term memory and fluency, children should be exposed regularly to the following agreed components:

### **Regular Retrieval and Number Fluency**

In Reception and KS1, the Mastering Number programme from the NCETM will be delivered 3 times a week. These are discrete and separate from the main maths lesson of the day. The programme has been developed by specialist maths teachers and academics from the NCETM and aims to enable all children to: make good progress towards Early Learning Goals or year group expectations; develop number fluency and 'number sense'; be able to effectively communicate their mathematical ideas and to develop confidence in themselves as mathematicians.

In KS2, 2 to 3 times a week, children will be set Flash Back 4 questions from the White Rose resources which ask children questions from learning from the current unit, last unit and units covered in the previous term and previous year. This repetition will develop children's confidence as well as their ability to retrieve previous learning.

Children may be given other forms of fluency work, either as part of the maths lesson or at a different time of day. This may be in the form of Times Table Rock Stars (TTRS), mental arithmetic quizzes, CLICs and Learn Its or any other quick recall practise activity focused on number.

### **Reflective Plenary**

At the end of a lesson, all children should have made progress by learning a new technique, gaining an improved understanding of a concept or being able to complete a new activity.

This new learning may be evidenced by writing a purple pen comment (Year 2 and KS2) or by drawing a self-assessment image (Year 1).

Example: *"Today I have learned that, when you subtract fractions with the same denominator, you only need to subtract the numerators and keep the denominator the same."*

This will allow children to develop their confidence and ability in discussing maths using the correct terminology which can then be applied to reasoning and problem-solving situations.

## Recording Learning

Mathematical learning is evidenced throughout the school in a number of ways.

In EYFS, maths is recorded through photographs, creative work, worksheets, videos and scribed pupil voice and included in individual children's learning journeys.

In Years 1-6 all children have a maths book where the majority of maths learning is recorded. Maths books should reflect the vibrant, stimulating and rigorous maths curriculum in place at Shap. Therefore, children's work will be shown: in photographs of practical activities; fluency, reasoning or problem-solving question sheets; written calculations, procedures, explanations or discussions, group or partner work; open or closed tasks; retrieval practise or computer work. Maths may also be completed in other subject books where cross-curricular learning is completed, particularly in science and geography.

Each piece of maths work in books should include:

- The date
- The learning intention
- From Year 3 onwards, a margin drawn on the left-hand side
- 1 number written in each square
- From Year 3 onwards, if completing many calculations, then it is recommended that children fold the page in half and draw a margin in the middle of the page to save space and help align place values columns
- Any sheets or pictures stuck in neatly

Presentation in maths books is to be consistent, age-appropriate and show that children take pride in their work.

## Marking and Feedback

Marking in maths should be diagnostic, summative and should enable children to know how to move on to the next step or phase of their learning journey. Verbal feedback is the most powerful form of feedback and teachers will complete this with individuals or groups of children as part of their lesson.

Where verbal feedback has not been given, teachers may write a comment or question for the children to answer and complete to help them achieve the objective or deepen their understanding. Children respond to marking using their Purple Polishing Pen/Purple Pen of Progress.

Maths work can also be marked using self or peer assessment with children having input on their learning and being able to see their own progress and attainment through this form of marking.

Marking should be useful for children and teachers and help teachers to plan same-day or next-day interventions and help plan the next day's lesson.

All marking will be in accordance with the school's marking policy.

## Times Tables and the Year 4 Multiplication Check

Times tables are taught and practised throughout the school as they are an essential component of children's numerical literacy.

The following progression for multiplication times tables is followed at Shap and is based on the *Ready to Progress* (DfE, 2020) criteria:

Year 1: Be able to count forwards and backwards in multiples of 2s, 5s and 10s

Year 2: Be able to recall 2, 5 and 10 multiplication facts

Year 3: Be able to recall 2, 5 and 10 division facts and 3, 4, 8 and 11 multiplication and division facts

Year 4: Be able to recall 6, 7 and 9 and 12 multiplication and division facts (children should be able to recall all multiplication facts up to 12 x 12)

Year 5/6: Be able to quickly recall all multiplication and division facts up to the 12 times table and apply these to problem solving situations

This progression is followed to allow children to be confident and attain highly in the statutory Year 4 Multiplication Times Table Check.

### **Times Table Rockstars (TTRS)**

At Shap we use TTRS to help children practise their times tables from Year 2 - 6. Awards are given for pupils who participate and make progress on TTRS. These are celebrated in the Celebration Worship Time on a Friday.

Children in Year 3/4 use the 'Sound Check' programme on TTRS in lesson, intervention or early morning work time at the class teacher's discretion. This follows the structure of the Year 4 Multiplication Times Table Check.

In KS1 and KS2, each class will have access to the laptop trolley and will spend time on TTRS so that pupils and teachers can complete against each other and keep motivation high. This may be as part of a maths lesson or early morning activity.

Where laptops or tablets are unavailable, class teachers will also use the TTRS paper worksheets to develop number fluency in multiplication and division.

Class teachers will ensure children are set the correct times tables they need to practise on TTRS and will use the 'Heat Maps' to assess children's strengths and weaknesses in particular times tables. These 'Heat Maps' will be used to tailor further support.

Children in Years 2 – 6 will know their login details to TTRS and, where home online access permits, be able to access and use TTRS to practise their times tables for homework (see Homework Policy).

Children in Year 2 will only have access to TTRS once they have been taught the relevant multiplication block from White Rose. This will enable children to develop a secure conceptual understanding of multiplication before being asked to complete abstract questions.

## **Impact**

Through the intent and implementation of maths teaching and learning at Shap, we expect that by the end of Year 6, our children will:

- Be confident mathematicians who are resilient, open to having a go at new mathematical problems and questions and who shun the 'I can't do maths/ I'm no good at maths' attitudes and stereotypes that can be significantly damaging to a learner's self-esteem and mind set ( ).
- Enjoy maths.
- Be fluent in the fundamentals of mathematics.
- Manipulate and use number skills confidently and accurately.
- Securely talk and express their mathematical ideas clearly using the correct terminology and vocabulary.
- Reason and problem solve by applying their knowledge to a range of different questions including simple and more complex problems.
- Flexibly and fluidly move between different contexts and representations of maths.
- Recognise relationships and make connections between maths concepts and with other curriculum subjects.
- Show a high level of pride in their presentation and communication of maths.

We expect that throughout the school all adults and children foster an 'I can' attitude to maths and challenge any thoughts to the contrary. Maths lessons will be motivating, challenging and engage all children at all levels. Children will enthusiastically talk about their maths lessons and be able to explain their learning and real-life implications for learning maths. We expect that all children will be working on and enhancing the skills listed above.

We expect that at the end of each year children will have achieved Age Related Expectations (ARE) for their year group. Some children will have progressed further and achieved greater depth (GDS). Children who have gaps in their knowledge, or who are accessing a different curriculum, receive appropriate support and intervention to make excellent progress from their starting point.

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## Assessment

The impact of our mastery approach to the teaching and learning of maths will come through different forms of assessment that will happen daily, weekly, termly and yearly; both through mathematics lessons and in targeted individual and group interventions or tuition. Assessment will take many forms.

### **Formative Assessment**

Formative assessment is completed throughout lessons by the teacher and support staff. The outcomes of formative assessment will inform next steps, interventions and future planning. Examples of formative assessment may be:

- Questioning
- Observations
- Self-assessment
- Written work
- Mini-whiteboard work
- Conferencing
- POP tasks
- TTRS battles, CLICs, Learn Its, SAFEs, Flashback 4s etc

### **Summative Assessment**

Summative assessments take place at the end of term or at the end of units of work to assess the knowledge, skills and understanding that has been retained. Examples of summative assessment in maths learning at Shap include:

- Rising Star PUMA assessments to be taken towards the end of the Autumn, Spring and Summer terms
- Previous SATs papers taken in Year 2 and Year 6, at the discretion of the class teacher
- White Rose end of unit assessment questions may be used at the teacher's discretion
- Statutory assessment tests will take place in Year 6 and Year 4 will complete the Multiplication Check

### **Impact of Assessment**

Teacher's will input assessment data from PUMA assessments onto the school's data system FFT. Data will also be entered onto the Rising Stars Mark system to show domain strengths and weaknesses and produce a gap analysis. This will also generate a standardised score for each child for the particular termly assessment. This data should be taken alongside teacher judgement of the children's day-to-day attainment and performance in maths lessons to reach a final judgement as to whether the child is working at: WTS (Working Towards) EXS (Expected) or GDS (Greater Depth) and recorded on the maths tracker on FFT.

**The subject leader** and class teachers will analyse their own class data and will plan maths interventions from this. The maths leader will analyse the school data to identify common strengths, weaknesses, areas for support, attainment, progress among individuals and groups and as a triangulation tool with other monitoring instruments, such as: pupil voice, learning walks, observations and book scrutiny.

Assessment is also used to help with reporting to parents. This is formally via two parent's consultations over the academic year and an end of year report in the summer term. Teachers should keep parents up-to-date with their child's progress and attainment in maths and celebrate successes and inform them in a timely manner if there is a concern regarding their child's maths learning and the steps being put in place to support the child to close the gap with their peers.





## **Inclusion:**

At Shap, we believe every child should have equal access and opportunities to mathematical equipment, resources and quality first teaching. The philosophy of the mastery approach is that all children are taught together to achieve the same objective. Children on the SEND register or on a School Support Plan should be included with the class in the maths lessons. To ensure all children access the learning at their appropriate age and stage, teachers will employ a variety of different differentiation techniques. These may include:

- Open ended activities or investigations where differentiation is by outcome
- Practical resources available for all learners
- Carefully considered questions using different numbers or representations
- Grouping – either with similar ability or mixed ability to encourage collaborative learning
- Adult support – teachers will use formative assessment to deploy teaching staff or teaching staff will be asked to support individuals or groups ahead of time through teacher planning.

We always aim for children to work on the same curriculum content as their peers; however, a few children may need to work on the end of year expectations for a younger year group. Their learning will in all cases be rich and designed with a clear progression in mind using the Ready to Progress documentation (DfE, 2020). Children who are identified as needing extra support in maths will be added to the provision map and a suitable intervention will be planned and delivered by the class teacher or teaching assistant.

Children who are identified as gifted in maths will be recorded on the school's Gifted and Talented Register. For children identified as gifted in maths, teachers will provide greater challenges in lessons, and offer further opportunities for them to develop their gifts outside of the normal timetable. For example, being selected for the Primary Maths Challenge or inter-school maths competitions on offer within the school's cluster. Teachers will inspire, motivate and challenge gifted pupils by planning for breadth and depth. Breadth enables children to compare and contrast, to locate their learning in a wider context and to make connections between different areas of learning. Depth is achieved by asking children to delve deeper into a given subject or topic and may come as a result of working closely on one problem or by introducing additional knowledge, concepts or skills. It is about thinking intellectually. Challenge for gifted children should involve discourse that enables children to learn techniques for expressing their views, for posing questions and for interrogating the views of others (DfCSF, 2008). Only in exceptional circumstances will gifted children be given content from a year group above their own, it is not recommended that children are moved beyond their own year group as they will become better mathematicians by going into depth in their own year group curriculum (Royal Society, 2012).

### **Monitoring and Review**

The maths subject leader will provide a strategic direction and lead for the subject in school, so it enjoys a high profile and is benefitting the children at Shap. Regular monitoring activities, to ensure the maths policy is followed and current provision is effective, are undertaken by the maths subject leader. These activities include lesson observations, learning walks, pupil voice, book scrutiny, staff audits, resource audits, school community questionnaires and staff discussions. The maths subject leader will support colleagues in the delivery of maths, keeping up to date with current research and developments and seeking out professional development opportunities.

It is the responsibility of our governing body to agree and then monitor the school mathematics policy. This is done by the Educational Standards committee of the governing body. The governing body may, at any time, request from the maths subject leader Headteacher a report on the way maths is organised in our school.



## References

[Mathematics programmes of study: key stages 1 and 2 \(publishing.service.gov.uk\)  
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/335158/PRIMARY\\_national\\_curriculum\\_-\\_Mathematics\\_220714.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335158/PRIMARY_national_curriculum_-_Mathematics_220714.pdf)

