

# **St. Margaret's CEVAP School**



## **MATHS POLICY**

## **Introduction**

This policy outlines the teaching, organisation and management of mathematics taught and learnt at St Margaret's CEVAP School. The policy has been drawn up by the mathematics leader, shared and discussed with all staff and has the full agreement of the Governing Body.

## **Purpose**

The purpose of this policy is to ensure that all staff are able to implement the teaching of maths to a high standard in order for our pupils to achieve to the best of their abilities.

In September 2017 we began transitioning towards a mastery approach to the teaching and learning of mathematics. We understood that this would be a gradual process and take several years to embed. The rationale behind changing our approach to teaching mathematics lay within the research of the theorists Skemp, Bruner and Dienes and the NCTEM maths hubs as well as the 2014 National Curriculum which states:

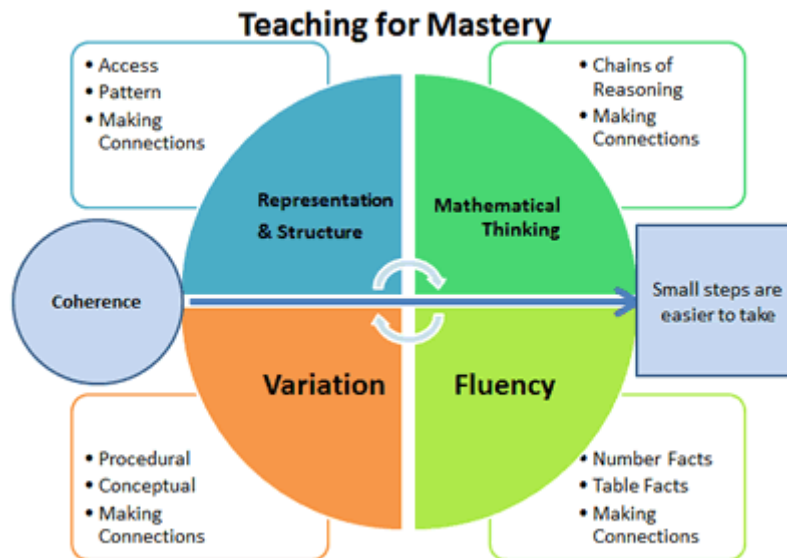
The expectation is that most pupils will move through the programmes of study at broadly the same pace.

Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.

Those who are not sufficiently fluent with earlier material should consolidate their understanding, including additional practice, before moving on.

To support our mastery approach, Inspire and White Rose is being used throughout the school. Every class is using CPA approach to help build a strong foundation to build upon and develop in each year group. In upper KS2 a mixture of White Rose and 'Target your Maths' is being used as a way of practising the skills then applying them to more challenging questions.

## 5 Big Ideas (See Appendix for examples)



Our teaching for mastery is underpinned by the NCETM'S 5 Big Ideas. Opportunities for mathematical thinking allow children to make chains of reasoning connected with the other areas of the curriculum. A focus on Representation and Structure ensures concepts are regularly explored using concrete, pictorial and abstract representations. The children actively look for patterns as well as specialise and generalise whilst problem solving. Coherence is achieved through the planning of small connected steps to link every question within a topic. Teachers use both procedural and conceptual Variation within their lessons and there remains an emphasis on Fluency with a relentless focus on number and times table facts.

### Rationale

Mathematics equips pupils with the uniquely powerful set of tools to understand and change the world. These tools include logical reasoning, problem solving skills and the ability to think in abstract ways. Mathematics is important in everyday life. It is integral to all aspects of life and we endeavour to ensure that children develop a positive and enthusiastic attitude towards mathematics that will stay with them.

It is vital that a positive attitude towards mathematics is encouraged amongst all our pupils to foster confidence and achievement in a skill that is essential in our society. At St Margaret's, we use the EYFS (2021 – updated framework) and the National Curriculum for Mathematics (2014) as the basis of our mathematics programme. We are committed to ensuring that all pupils achieve mastery in the key concepts of mathematics, appropriate for their age group, in order that they make genuine progress and avoid gaps in their understanding that provide barriers to learning as they move through education. Key Stage 1 and Lower Key stage 2 are supported by Inspire but also use elements of White Rose to support their mastery teaching. Upper Key Stage 2 are using White Rose and Target your Maths.

## Organisation and Teaching Methods

At St Margaret's CEVAP School, Maths is taught as a discrete subject in a daily lesson.

Teachers at St Margaret's believe in the importance of mathematics and the vast majority of children can succeed in learning in line with national expectations. There is differentiation in outcome as regards to teaching Inspire and the same with White Rose as the children are given opportunities to challenge themselves once the main activity is completed. The challenge normally involves what has been taught that day but using that knowledge to interpret it in a different way. As regards 'Target your Maths' it is differentiated and the children can choose a section to work from depending on how secure they feel about the mathematical topic.

The reasoning behind mathematical processes is emphasised through CPA (concrete, pictorial and abstract) Children's conceptual understanding and fluency is strengthened if they experience concrete, visual and abstract representations of a concept during a lesson. Moving between the concrete and the abstract helps children to connect abstract symbols with familiar contexts, thus providing the opportunity to make sense of, and develop fluency in the use of, abstract symbols. For example, in a lesson about addition of fractions children could be asked to draw a picture to represent the sum Alternatively, or in a subsequent lesson, they could be asked to discuss which of three visual images correctly represents the sum, and to explain their reasoning. The children have manipulatives available to them in class to help them to represent different scenarios so that they can discover how to solve problems for themselves.

Precise mathematical language, often embedded in full sentences, is used by teachers so that mathematical ideas are conveyed with clarity and precision. We value 'mathematical talk' and children have many opportunities to talk about and evaluate their mathematics during lessons.

Conceptual variation and procedural variation are used extensively throughout teaching. This helps to present the mathematics in ways that promote deep, sustainable learning.

- Conceptual variation is where the concept is varied and there is intelligent practice. Positive variation is showing what the concept is, and negative variation is showing what the concept isn't. This clears away misconceptions at the very start. Within positive variation, both standard and non-standard variations are shown.
- Procedural variation is where different procedures and /or representations are used to bring about understanding. For example, teachers may collect several solutions for a problem (some right, some wrong) before guiding the class towards the most efficient method.

Sufficient time is spent on key concepts to ensure learning is well developed and deeply embedded before moving on.

We have successfully moved towards a mastery approach and have adopted the 7 Features of Lesson Design. This has been adopted in Key Stage 1 and is being fostered in key stage 2.

### **7 Features of Lesson Design**

1. Lessons are short but intense: teacher input usually lasts around 30 minutes giving ample time for independent practice whilst the teacher delivers rapid interventions should somebody require it. Independent practice includes reasoning, problem solving and higher-order thinking activities.
2. Lessons are sharply focused with one new objective introduced at a time.
3. Difficult points and potential misconceptions are identified in advance and strategies to address them planned. Key questions are planned, to challenge thinking and develop learning for all pupils.
4. The use of high-quality materials (White Rose Hub) and tasks (NRICH, NCETM materials) to support learning and provide access to the mathematics is integrated into lessons.
5. There is regular exchange between concrete/contextual ideas and their abstract/symbolic representation.
6. Making comparisons is an important form in developing deep knowledge. The questions ‘What’s the same, what’s different?’ are often used to draw attention in the essential features of concepts.
7. Teacher-led discussion is interspersed with short tasks involving pupil to pupil discussion and completion of short activities. Formative assessment is carried out throughout the lesson: the teacher regularly checks pupil knowledge and understanding and adjusts the lesson accordingly.

**Progression of calculation methods:** We have a policy for guiding pupil progression in calculation methods to ensure continuity and consistency throughout the school. Please refer to the school’s Calculation Policy.

### **Early years**

We follow the Early Years Foundation Stage Statutory Framework (2021) to develop positive attitudes, interest and a strong grounding in understanding of number and numerical patterns in mathematics. This is developed through purposeful, play based experiences and will be represented throughout the indoor and outdoor provision. The learning will be based on pupil’s interests and current themes and will link to the expectations from Development Matters and mastery through White Rose. Mathematical understanding will be developed through stories, songs, games, imaginative play, child-initiated learning and structured teaching. As pupils progress, they will be encouraged to record their mathematical thinking in a more formal way.

### **Assessment**

At St Margaret’s we are continually assessing pupils’ progress. We see formative assessment as an integral part of the teaching process and strive to make our assessment purposeful, allowing us to match the correct level of work to the needs of the pupils, thus benefiting the pupils and ensuring confidence and progress. This formative assessment is regarded as an essential part of teaching and learning and is a

continuous process which is shared with all learners. All class teachers are committed to raising standards of attainment through regular teacher assessment, including Assessment for Learning (AFL) and are responsible for the assessment of all pupils in their class.

Information for assessment is gathered in a variety of ways:

Formative Assessment	<ul style="list-style-type: none"> <li>• Questioning and talking to the children</li> <li>• Daily teacher/pupil interaction and observations</li> <li>• Marking work</li> <li>• Pupil response to marking</li> <li>• Self and peer assessment</li> <li>• Informal oral and written tests</li> </ul>
Summative Assessment	<ul style="list-style-type: none"> <li>• Baseline/ Foundation Stage Profiles</li> <li>• Teacher Assessments</li> <li>• Statutory and Non-Statutory Assessment tests</li> </ul>

Pupils' progress is tracked through Foundation stage, and from Y1 to Y6 using Target Tracker and this data is used, together with teacher assessments, to identify children who would benefit from additional support.

### **Equality of Opportunity**

All children, irrespective of gender, race or ability are offered every opportunity to develop their maths skills through a variety of tasks and resources.

### **Recording Work**

Pupil's learning will be recorded in a variety of ways, in Mathematics exercise books and files with squared paper. Where children have shown a concrete approach to their work, photographs will also be included. All work should be dated, titled with a clear learning objective and presented with due care and attention to organisation, clarity and neatness. Children will record in pencil.

### **Reporting**

To Pupils: Teachers should give regular daily feedback of progress and attainment to pupils, verbally and in writing. Teacher marking reflects the Learning Objective and 'next steps' for the pupils' learning in line with the marking and feedback policy.

To Parents: Reports are sent home each term, and parents are invited to attend a parent/teacher consultation in the Autumn and Spring terms. In addition, parents are welcome to arrange a consultation with the class teacher at any time during the school year, and vice-versa.

### **Home/school links**

Home learning is regularly set and can include written tasks or games activities. Parents are encouraged to make maths learning fun and relevant to everyday life. Periodically, there are information evenings or presentations to parents. The school's Calculation Policy serves as a guide to parents as well as teachers.

## **Resources**

Basic everyday maths materials are located in each classroom and are shared between each set of year groups. More resources are stored centrally. The effective overall management and supply of these resources lies directly with the Maths leader and indirectly with individual class teachers.

Each class has a general bank of resources and manipulatives for day-to-day maths lessons. Further shared resources are stored centrally. We have also begun using a scheme of work called 'Number Stacks' as it targets the areas which children have gaps and uses manipulatives to add their understanding. This means children can work at their level and progress at their pace.

## **Information and Communication Technology**

ICT is used in various ways to support teaching and motivate children's learning. Each classroom has a laptop connected to an interactive whiteboard. Visualisers are also used in all classes. All teachers are provided with a laptop to support their planning and provision and are encouraged to use ICT to enhance teaching and learning in mathematics where appropriate. The school is equipped with 30 laptops and 30 chrome books. Each class also have additional devices to support interventions and to support learning. More recently we have bought into the app Times Table Rock Stars (TTRS) to support the learning of times tables specifically in year 4 and upwards. As well as Numbots, this is another app that provides fluency questions from year 1-3. The representations are similar to what we show the children in school.

## **Curriculum Leadership**

The role will include:

- Inspiring an exciting and creative approach to maths teaching at St Margaret's School
- Supporting maths teaching through advice, guidance, CPD and resources
- Sharing information acquired from courses or other sources that may be beneficial to staff
- Reviewing the maths policy and monitoring its implementation
- Regularly evaluating the maths scheme of work and amending as necessary
- The management, maintenance and storage of resources
- Organising pupils' participation in maths workshops and events
- Effectively managing the maths budget
- Reporting to parents, governors and others when appropriate

## **Monitoring and Review:**

The monitoring of the standards of children's work and the quality of learning and teaching mathematics is the shared responsibility of the S.L.T. and the subject leader. The work of the subject leader also involves supporting colleagues in the teaching of mathematics, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school.

Susan Elliott-Duff

Appendix:

5 Big Ideas:

## Big Ideas in Mastery: 1. Coherence

### Messages

1. Small steps are easier to take.
2. Focussing on one key point each lesson allows for deep and sustainable learning.
3. Certain images, techniques and concepts are important pre-cursors to later ideas. Getting the sequencing of these right is an important skill in planning and teaching for mastery.
4. When something has been deeply understood and mastered, it can and should be used in the next steps of learning.

For example:

Before teaching the written algorithm for subtraction:

$$\begin{array}{r} 47 \\ - 38 \\ \hline \end{array}$$

Pupils need to:

- be fluent in their number facts for single digit numbers
- have a good understanding that 47 can be partitioned into 40 and 7 or 30 and 17
- understand that 40 can be thought of as 4 tens
- understand that 3 tens and 4 tens make 7 tens and that this is the same as 30 and 40 make 70.

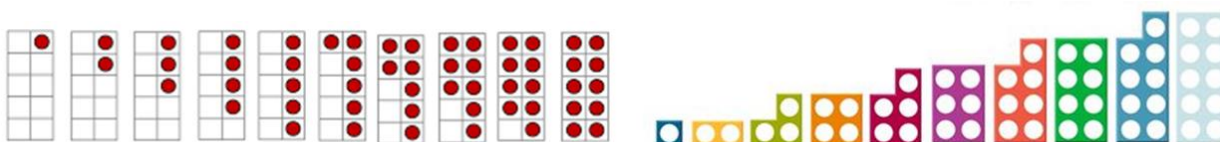
## 2. Representation & Structure

### Messages

1. The representation needs to pull out the concept being taught, and in particular the key difficulty point. It exposes the structure.
2. In the end, the children need to be able to do the maths without the representation
3. A stem sentence describes the representation and helps the children move to working in the abstract (“ten tenths is equivalent to one whole”) and could be seen as a representation in itself
4. There will be some key representations which the children will meet time and again
5. Pattern and structure are related but different: Children may have seen a pattern without understanding the structure which causes that pattern

**For example:**

Here are two representations for numbers within 10; the tens frame and Numicon:



Both are very helpful concrete and pictorial representations of number but, crucially, they are representing different structures. The tens frame is accentuating and drawing attention to the '5 and a bit' structure of numbers, whereas Numicon draws attention to the odd/even structure. Both images support seeing the complement to 10 (i.e. what needs to be added to make 10).

The two images of 6, for example give different (equally important) ways of thinking about the structure of 6 which in turn influence that ways the children might transform, compare and combine numbers when calculating.

### 3. Variation

**Messages**

- 5. The central idea of teaching with variation is to highlight the essential features of a concept or idea through varying the non-essential features.
- 6. When giving examples of a mathematical concept, it is useful to add variation to emphasise:
  - a. What it is (as varied as possible);
  - b. What it is not.
- 7. When constructing a set of activities / questions it is important to consider what connects the examples; what mathematical structures are being highlighted?
- 8. Variation is not the same as variety – careful attention needs to be paid to what aspects are being varied (and what is not being varied) and for what purpose.

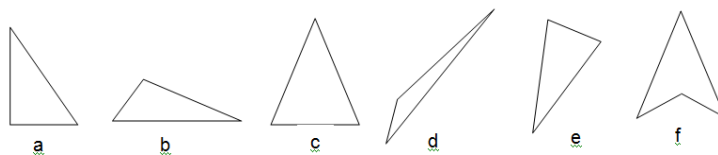
**For example:**

Procedural Variation:

$58 - 24 = \underline{\quad}$	$36 - 25 = \underline{\quad}$	$53 - 22 = \underline{\quad}$	$49 - 24 = \underline{\quad}$
$57 - 25 = \underline{\quad}$	$46 - 24 = \underline{\quad}$	$64 - 23 = \underline{\quad}$	$48 - 25 = \underline{\quad}$
$56 - 26 = \underline{\quad}$	$56 - 23 = \underline{\quad}$	$75 - 24 = \underline{\quad}$	$47 - 26 = \underline{\quad}$

Notice how the first and second numbers (the minuend and the subtrahend) in each column of calculations have been varied. This draws attention to the relationship between the two numbers in a subtraction and encourages some reasoning to explain why the answers change in the way they do. Working on such questions can offer learners an opportunity for 'intelligent practice' where they can explain what is going on and make up their own examples.

Conceptual Variation:



To get a sense of what a triangle is learners need to see examples of triangles which show all aspects being varied (length of sides, angles, orientation). If most triangles are shown with one side as a horizontal base and the vertex pointing upwards (as in a, b and c), this feature might be over-generalised and pupils might think that d or e are not triangles.

#### 4. Fluency

##### Messages

1. Fluency demands more of learners than memorisation of a single procedure or collection of facts. It encompasses a mixture of efficiency, accuracy and flexibility.
2. Quick and efficient recall of facts and procedures is important in order for learners' to keep track of sub problems, think strategically and solve problems.
3. Fluency also demands the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections and to make appropriate choices from a whole toolkit of methods, strategies and approaches.

**For example:**

Quick and accurate recall of all multiplication facts up to  $12 \times 12$  is important in order to free working memory to see the big picture and make decisions about when to use this knowledge to solve certain problems.

However, if a pupil only knows these facts as an unconnected collection of memorised phrases and does not know:

- that  $8 \times 6$  is the same as  $6 \times 8$  or twice  $4 \times 6$  or 12 less than  $10 \times 8$ ;  
or
  - does not know the connection between  $6 \times 8$  and  $16 \times 8$  or  $6 \times 80$  or  $0.6 \times 8$ ;  
or
  - when faced with a problem of finding how many books are in a bookcase with 8 shelves and 6 books on each shelf, does not know what mathematics to use
- ... then they have not attained fluency.

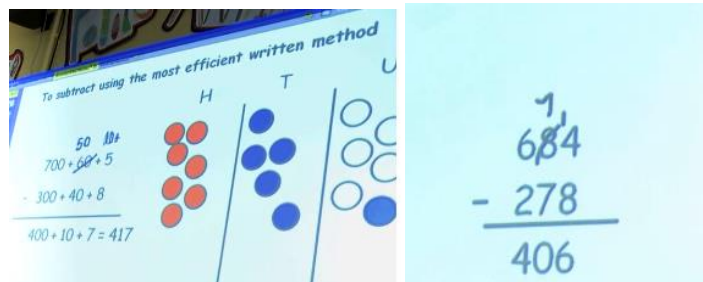
## 5. Mathematical Thinking

### Messages

1. Mathematical thinking is central to deep and sustainable learning of mathematics.
2. Taught ideas that are understood deeply are not just 'received' passively but worked on by the learner. They need to be thought about, reasoned with and discussed.
3. Mathematical thinking involves:
  - looking for pattern in order to discern structure;
  - looking for relationships and connecting ideas;
  - reasoning logically, explaining, conjecturing and proving.

### For example:

Asking “what’s the same and what’s different?” in a range of situations prompts and promotes mathematical thinking



Asking pupils to explain, convince, draw diagrams to illustrate an idea or strategy, reason and conjecture as a natural part of all activity in the mathematics classroom supports deep and sustainable learning.