

# UNITED SCHOOLS TRUST

## Kingsteignton School



### Maths Policy

**Article 13 (freedom of expression)** every child must be free to express their thoughts and opinions and to access all kinds of information, as long as it is within the law.

**Article 17 (access to information from the media)** every child has the right to reliable information from a variety of sources.

**Article 28 (right to education)** every child has the right to a good quality education and must be encouraged to go to school.

**Article 29 (goals of education)** Education must develop every child's personality, talents and abilities to the full.

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This policy is written in line with the New National Curriculum 2014.

### Intent

Review December 2023 Next review December 2024

Mathematics is vital; it is our key to making sense of the world around us. We strive to provide a mathematically stimulating environment where children are able to calculate, reason and solve problems both in number and in their everyday lives. We aim to build a mathematical learning culture where children are resilient and take risks in their learning.

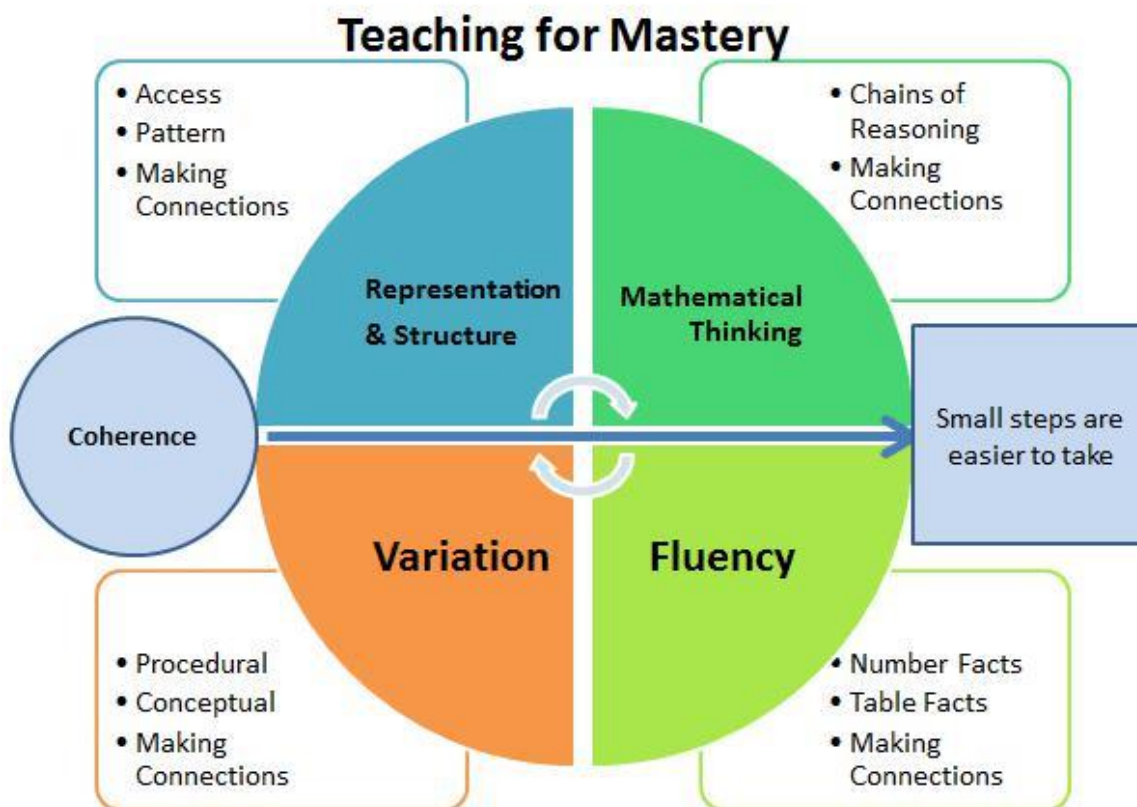
### Aims for our pupils

- To develop a growth mindset and positive attitude towards mathematics.
- To become confident and proficient with number, including fluency with mental calculation and look for connections between numbers.
- To become problem solvers, who can reason, think logically, work systematically and apply their knowledge of mathematics.
- To develop their use of mathematical language.
- To become independent learners and to work co-operatively with others.
- To appreciate real life contexts to learning in mathematics.

## FLUENCY – REASONING – PROBLEM SOLVING

These three key aims of the National Curriculum should be addressed in each sequence of learning.

### 5 Big Ideas of Mastery



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 their mathematics.
- A focus on **Representation and Structure** ensures concepts are explored using concrete, pictorial and abstract representations, the children actively look for patterns and generalise whilst problem solving.
- **Coherence** is achieved through the planning of small, connected steps to link every question and lesson 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.

### 8 Classroom Norms to Establish:

1. Everyone can learn mathematics to the highest levels.
2. If you 'can't do it', you 'can't do it **yet**'.
3. Mistakes are valuable.
4. Questions are important.
5. Mathematics is about creativity and problem solving.
6. Mathematics is about making connections and communicating what we think.
7. Depth is much more important than speed.
8. Mathematics lessons are about learning, not performing.

### Principles of a Maths Mastery Approach

To establish:

#### **Representation and Structure**

Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation.

#### **Mathematical Thinking**

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

#### **Fluency**

Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.

#### **Variation**

This 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.

### Teaching for Mastery Principles

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- **It is achievable for all** – we have high expectations and encourage a positive ‘can do’ mindset towards mathematics in *all* pupils, creating learning experiences which develop children’s resilience in the face of a challenge and carefully scaffolding learning so everyone can make progress.
- **Deep and sustainable learning** – lessons are designed with careful small steps, questions and tasks in place to ensure the learning is not superficial.
- **The ability to build on something that has already been sufficiently mastered** – pupils’ learning of concepts is seen a continuum across the school.
- **The ability to reason about a concept and make connections** – pupils are encouraged to make connections and spot patterns between different concepts (E.g. the link between ratio, division and fractions) and use precise mathematical language, which frees up working memory and deepens conceptual understanding.
- **Conceptual and procedural fluency** – teachers move mathematics from one context to another (using objects, pictorial representations, equations and word problems). There are high expectations for pupils to learn times tables, key number facts (so they are automatic) and have a true sense of number. Pupils are also encouraged to think whether their method for tackling a given calculation or problem is Appropriate, Reliable and Efficient (A.R.E).
- **Problem solving is central** – this develops pupils’ understanding of why something works so that they truly have an appreciation of what they are doing rather than just learning to repeat routines without grasping what is happening.
- **Challenge through greater depth** - rather than accelerated content, (moving onto next year’s concepts) teachers set tasks to deepen knowledge and improve reasoning skills within the objectives of their year group.

## Implementation

### Aims

The National Curriculum for mathematics aims 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.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to

develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. 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 through additional practice, before moving on

### Curriculum design and planning

- Staff use **White Rose Maths Schemes of Learning** as a starting point in order to develop a coherent and comprehensive conceptual pathway through the mathematics. The focus is on the **whole class progressing together**. Collaborative planning with year group colleagues is encouraged to ensure consistency.
- Learning is broken down into small, connected steps, building from what pupils already know. The lesson journey should be detailed and evident on flipcharts (Smart Notebook or PowerPoint) as there is no requirement for teachers to produce detailed paper plans.
- 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.
- Contexts and representations are carefully chosen to develop reasoning skills and to help pupils 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. These may include **White Rose Maths Schemes of Learning and Assessment Materials**, **Maths No Problem** textbook activities, **NCETM Mastery Assessment** materials, **NRICH**, visual images and concrete resources.
- Opportunities for extra fluency practice (*instant recall of key facts, such as number bonds, times tables, division facts, addition and subtraction facts*) should be provided outside mathematics lessons (morning starters or post-lunch).

### Lesson Structure

- Lessons are sharply focused; digression is generally avoided.
- Key new learning points are identified explicitly.
- There is regular interchange between concrete/contextual ideas, pictorial representations and their abstract/symbolic representation.

- Mathematical generalisations are emphasised as they emerge from underlying mathematics, which is thoroughly explored within contexts that make sense to pupils.
- 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 (for example, in the form of whole class recitation, repeating to talk partners etc) is used frequently. This helps to verbalise and embed mathematical ideas and provides pupils 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.
- Formative assessment is carried out throughout the lesson; the teacher regularly checks pupils’ knowledge and understanding and adjusts the lesson accordingly.
- Gaps in pupils’ knowledge and understanding are identified early by in-class questioning. They are addressed rapidly through individual or small group intervention, either on the same day or the next day, which may be separate from the main mathematics lesson, to ensure all pupils are ready for the next lesson.
- Teachers discuss their mathematics teaching regularly with colleagues, sharing teaching ideas and classroom experiences in detail and working together to improve their practice.

## **School Curriculum**

### **Maths in the Early Years (EYFS)**

Teachers in the EYFS ensure the children learn through a mixture of adult led activities and child-initiated activities both inside and outside of the classroom. Mathematics is taught through an integrated approach. This is supported by the Birth to 5 Matters non statutory guidance as well as White Rose Medium term plans for EYFS Maths.

The EYFS Framework in relation to mathematics aims for our pupils to achieve the following Early Learning Goals:

#### **ELG: Number**

- Develop a deep understanding of number to 10, including the composition of each number.
- Subitise up to 5.
- Automatically recall number bonds up to 5 and some number bonds up to 10, including doubling facts.

#### **ELG: Numerical Patterns**

- Verbally count beyond 20, recognising the pattern of the counting system.
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.

- Explore and represent patterns within numbers up to 10, including even and odd numbers, double facts and how quantities can be distributed equally.

In addition, the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures.

The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, we therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, we can introduce key stage content during an earlier key stage, if appropriate. All schools are also required to set out their school curriculum for mathematics on a year-by-year basis and make this information available online.

### **Calculation Policy**

This policy looks at both mental and written procedures. It is important that children do not abandon jottings and mental methods once pencil and paper procedures are introduced. Therefore, children will always be encouraged to look at a calculation/problem and then decide which is the best method to choose; concrete, pictorial or abstract. Children are not expected to work through every stage at a set time; it is about working at the right level and using the methods appropriate for each child. This policy is for guidance purposes only as our job is to find the most efficient method that the individual child can use with understanding. This may well mean that children do not experience all the methods illustrated and focus on one or two.

We have a choice in the way that we teach calculations. The children will always be exposed to the concrete, pictorial and abstract way of working to solve a problem. However, they may progress more quickly through these stages to abstract once they are fluent in their concrete and pictorial understanding.

### **Times Tables**

Teaching of times tables is vital. Children must have a conceptual understanding in order to apply the knowledge to problems. Teachers will teach children times tables through a range of fun, interactive activities to build confidence and understanding.

Alongside this, we use Times Tables Rock Stars in order to further improve speed of tables recall and use in school. Each pupil has their own individual login and is able to practise both in school and at home. Pupils will be expected to use this as part of homework tasks throughout the year. Class teachers can set specific tables goals for them using this programme if it is required.

### **Testing of Tables**

- Children may be tested on specific key tables in lessons, but this is done in a supportive, non-threatening, environment. Most importantly, they need to be taught how to learn and use their times tables.

### **Differentiation**

- Tasks can be differentiated through the use of concrete, pictorial and abstract representations.

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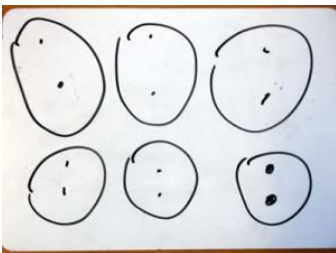
### Concrete representation

The children are first introduced to an idea or a skill by acting it out with real objects. In division, for example, this might be done by separating apples into groups of red ones and green ones or by sharing 12 biscuits amongst 6 children. This is a 'hands on' approach using real objects and it is the basis for conceptual understanding. Concrete apparatus such as numicon, double sided counters, base 10 apparatus and place value counters are used widely across school.



### Pictorial representation

This is used when a child has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem. In the case of division this could be the action of circling objects.



### Abstract representation

The symbolic stage – a student is now capable of representing problems by using mathematical notation, for example:  $12 \div 6 = 2$ . This is clearly the more confusing and mysterious of the three and without the 'hands on' and pictorial steps can be tricky for children to understand.

$$12 \div 6 = 2$$

### Homework

- Homework is set in line with the school's Homework Policy. Please see the homework policy for timings.
- Homework will be a mixture of recap on prior learning as well as directly linking to class work.

### Classroom Equipment

- This will vary from year group to year group, as this has to be age appropriate.



- All resources MUST be easily accessible to all children so that they can make the important decisions regarding which equipment to use .
- Equipment is regularly used by teachers to model its application.

### **Central Resources**

- Metre sticks • Trundle wheels • Balancing scales • Weighing scales • Digital scales • Measuring jugs/containers • Geoboards • Dice • Clocks • 3D shapes • Fraction walls • Coins • Tape measures

### **Digital Resources**

### **White Rose Maths**

This is the scheme we use for our planning.

### **Times Table Rock Stars**

A resource used to support the teaching of times tables from Year 2 to Year 6.

### **Numbots**

A resource used to support the teaching of number bonds and number recognition from Early Years to Year 2.

### **Impact**

### **Assessment**

Teachers make assessments of pupils daily through:

- regular marking of work
- analysing errors and picking up on misconceptions
- asking questions and listening to answers
- facilitating and listening to discussions
- making observations

These ongoing assessments inform future planning and teaching. Lessons are adapted readily and short term planning is evaluated in light of these assessments.

- For Year 2 to Year 6, formal assessments occur at the end of each term and are used to inform teacher assessments and should test 'new learning' in a new context. Past SATS papers will also be used to assess progress towards the end of year objectives.

- In Year 1 the children are slowly introduced to these tests throughout the year and all children will have completed such assessment by the end of the summer term of Year 1.

- The Principal, subject leaders and class teachers work together to analyse all assessments completed to identify gaps in learning and provision and to ensure this is in place for the next half term of planning.

### **Statutory Assessments**

- EYFS Baseline assessments
- KS1 National Curriculum Tests and teacher Assessments (Year 2)
- Multiplication Tables Check (Year 4)
- KS2 National Curriculum Tests (Year 6)

### **Data**

All teachers are responsible for keeping accurate records of attainment and progress made in line with the school policy on recording data. See assessment policy.

### **Marking**

Work should be marked in line with the school policy for marking. Live, in the lesson, verbal feedback is to be encouraged so that children are being supported and moved on during the lesson rather than retrospective marking which has less impact.

### **Display**

We aim to inspire and challenge the children, supporting their learning through a working wall combined with celebrating achievement.

- All classrooms must have a display area for maths and a working wall
- Working walls should be referred to during the lesson and reflect current learning

### **Monitoring of Standards**

Monitoring of maths across the whole school is completed by the maths Subject Leader and Principal. Class teachers have the responsibility of monitoring their year group each term and reporting to the Principal and Subject Leader.

### **Role of the Subject Leader**

- Ensures teachers understand the requirements of the National Curriculum and supports them to plan lessons when necessary. Leads by example by setting high standards in their own teaching.

- Leads the whole-school monitoring and evaluation of teaching and learning in mathematics by observing teaching and learning in mathematics regularly; analysing assessment data in order to plan whole school improvement in mathematics; conducting work scrutiny to inform evaluation of progress; conducting pupil interviews.
- Takes responsibility for managing own professional development by participating in external training, independent private study, engaging in educational research and scholarly reading and keeping up-to-date with Teaching for Mastery developments.
- Keeps parents informed about mathematics issues.
- Ensures that the school's senior leaders and trustees are kept informed about the quality of teaching and learning in mathematics.
- Works in close partnership with the school's senior leaders to ensure the learning needs of all pupils in mathematics are met effectively.
- Keeps the school's policy for mathematics under regular review.

Links to other policies:

- Calculation policy
- Assessment policy
- Inclusion policy
- Homework policy
- Marking and feedback policy

Reviewed December 2022    Review date: December 2023