

# Redbourn Primary School



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## How We Teach Maths at Redbourn Primary School

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## Intent

At Redbourn, we believe that our pupils deserve a creative and ambitious mathematics curriculum, rich in skills and knowledge, which ignites curiosity and prepares them well for everyday life and future employment. We believe maths is fun where we foster positive 'can do' attitudes and we promote the fact that, 'We can all do maths!' We believe all children can achieve in mathematics, and teach for secure and deep understanding of mathematical concepts through manageable steps. We encourage resilience, adaptability and acceptance that struggle is often a necessary step in learning. We use mistakes and misconceptions as an essential part of learning and provide challenge through rich and sophisticated problems.

At our school, the majority of children will be taught the content from their year group only. They will spend time becoming true masters of content, applying and being creative with new knowledge in multiple ways. A wide range of mathematical resources are used and pupils are taught to show their workings in a concrete, pictorial and abstract form wherever suitable. Pupils are required to explore maths in depth, using mathematical vocabulary to reason and explain their workings.

We aim for all pupils to:

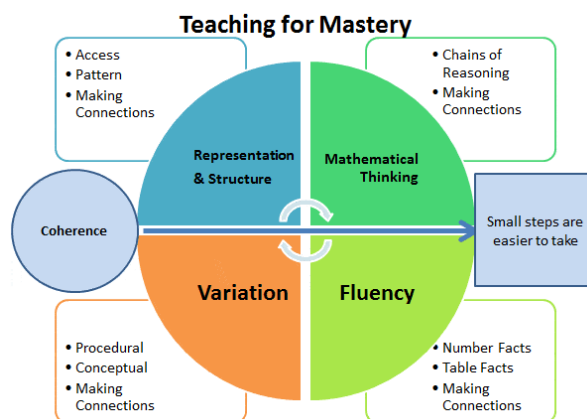
- become **fluent** in the fundamentals of mathematics so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- be able to **solve problems** by applying their mathematics to a variety of problems with increasing sophistication, including in unfamiliar contexts and to model real-life scenarios.
- **reason** mathematically by following a line of enquiry and develop and present a justification, argument or proof using mathematical language.
- have an appreciation of **number and number operations**, which enables mental calculations and written procedures to be performed efficiently, fluently and accurately to be successful in mathematics.

## Teaching for Mastery

At Redbourn Primary School, we teach for mastery and believe that fluency, reasoning and problem solving are at the core of all maths lessons, including maths across the curriculum. This approach begins from nursery and extends throughout the school to year 6.

Mastery of mathematics is something that we want pupils - all pupils - to acquire, or rather to continue acquiring throughout their school lives, and beyond. A typical Maths lesson will provide the opportunity for children to work through Fluency, Reasoning and Problem Solving activities.

all



The focus on mastery and growth mind-set learning in mathematics instils behaviours such as determination, respect, perseverance and resilience, all of which are part of a values system that create a more positive and harmonious Britain. Maths teaching for mastery rejects the idea that a large proportion of people 'just can't do maths'.

## 2. Teaching and Learning

Effective teaching for mastery is underpinned by five big ideas, first published by the National Centre for Excellence (NCETM) in mathematics in 2017.

### Coherence

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

### 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 student: 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

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.

## Implementation

### White Rose Maths Scheme of Learning

To ensure whole consistency and progression, the school from Reception – Year 6 uses the nationally recognised White Rose Maths scheme. The White Rose curriculum is a cumulative curriculum, so that once a topic is covered, it is met many times again in other contexts. For example, place value is revisited in addition and subtraction and multiplication and division. The curriculum is designed to have an emphasis on number, with a large proportion of time spent reinforcing number to build competency.

Lessons are planned to provide plenty of opportunities to build reasoning and problem solving elements into the curriculum. Objects, pictures, words, numbers and symbols are everywhere. The mastery approach incorporates all of these to help children explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand what they have learnt. When introduced to a new concept, children have the opportunity to use concrete objects and manipulatives to help them understand what they are doing. Alongside this, children are encouraged to use pictorial representations. These representations can then be used to help reason and solve problems. Both concrete and pictorial representations support children's understanding of abstract methods.

- **Concrete** – children have the opportunity to use concrete objects and manipulatives to help them understand and explain what they are doing.
- **Pictorial** – children then build on this concrete approach by using pictorial representations and drawings, which can then be used to reason and solve problems.
- **Abstract** – With the foundations firmly laid, children can move to an abstract approach using numbers and key concepts with confidence.

### Core Expectations for planning

- All planning must be done using the Redbourn Maths planning proforma on the system.
- Follow WRM yearly overview however you can tweak the number of weeks for each block depending on your cohort/class.
- Each step does not have to be a single lesson – it can be or it can be less or more.
- Use the **notes and guidance page** for each step to help formulate questions, consider misconceptions, sentence stems/vocabulary etc.
- Use questions from **Key Learning page** to model teaching.
- Use **Reasoning and Problem solving page** either for modelling further teaching /challenge /deepening understanding.
- Fluency, Reasoning and Problem solving questions from WRM **MUST** form the basis of the activities provided for **majority of pupils**.
- These activities can be supplemented with other resources that you feel will **deepen understanding** such as resources from Nrich, NCETM, Classroom secrets etc.
- All students should have **access to concrete resources or the option to draw pictorial representations** if needed for their learning within that particular skill and this should be clear in the planning.
- **Differentiation** can be in the form of scaffolding with children working at different stages within the CPA model. It can also be in the form of looking at objectives for the year group below for key children but NEVER above. Fluency activities should not be given to only WTS and reasoning / problem solving questions to EXS/GDS. All children should have opportunities to show they are fluent, can reason and problem solve within each skill.
- **Key vocabulary and sentence stems** should be evident within the planning.

## **Core Expectations for lessons**

- Maths is taught a minimum of 4 times a week across the school.
- Mathematical topics are taught in blocks, to enable the achievement of 'mastery' over time. These teaching blocks are broken down into smaller steps, to help children understand concepts better. This approach means that children do not cover too many concepts at once which can lead to cognitive overload.
- Lesson design identifies the new mathematics that is to be taught, the key points, common misconceptions and a carefully sequenced journey through the learning.
- In a typical lesson, pupils sit facing the teacher and the teacher leads back and forth interaction, including questioning, short tasks, explanation, demonstration, and discussion.
- Teachers model and teach correct mathematical vocabulary and this is then displayed on the working wall.
- Pupils are encouraged to use correct mathematical vocabulary and speak in full sentences using sentence stems to support them if needed.
- Each lesson phase provides the means for children to achieve greater depth, with children who are quick to grasp new content, being offered rich and sophisticated problems, within the lesson as appropriate.
- During independent activity, pupils are encouraged to use movement breaks to select their next question when they are ready to move on.
- Teachers reinforce an expectation that all children are capable of achieving high standards in Mathematics. The large majority of children progress through the curriculum content at the same pace.
- Significant time is spent developing deep knowledge of the key ideas that are needed to underpin future learning. This ensures that all can master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind.
- Teachers use precise questioning in class to test conceptual and procedural knowledge and assess children regularly to identify those requiring intervention, so that all children keep up.
- If a pupil fails to grasp a concept or procedure, this is identified quickly and early intervention ensures the pupil is ready to move forward with the whole class in the next lesson.
- All pupils should have access to concrete resources and know where they are if needed throughout the lesson.

## **Core Expectations for books**

- Teachers and pupils value the importance of presentation within their maths books in order to be systematic and methodical in their working out.
- Pupils from Year 1 – Year 6 are encouraged to write one digit in one box.
- The short date is written in the top right hand corner and is underlined from Year 2 – Year 6.
- Books should highlight pupils using the squared paper to show their answers and working out as not all questions from White Rose Maths need to be stuck into the children's books.
- If needed, pupils should be encouraged to draw any pictorial representations in their books to support their learning.
- Number reversals should be identified by the teacher and pupils should be self-correcting using a purple pen.
- Pupils should be encouraged to be neat and systematic with their working out e.g. one dot in one square to show arrays or a line and a dot to show tens and ones.
- Reasoning questions should be answered using full sentences using the conjunction 'because.'

See examples below for presentation within maths books:

4 The Patel family went on holiday for 6 weeks.  
The Logan family went on holiday for 40 days.  
Which family went on holiday for longer?  
How do you know?

The Patel family because 6 weeks is 42 days and 40 days is less.

5

	0	0	0	0	0	0	0
	0	0	0	0	0	0	0


$2 \times 7 = 14$  ✓     $14 \div 7 = 2$  ✓  
 $7 \times 2 = 14$  ✓     $14 \div 2 = 7$  ✓

6

$7 \times 6 = 42$  ✓

There are 42 petals on 6 flowers altogether.

2 Rosie has 30 strawberries.

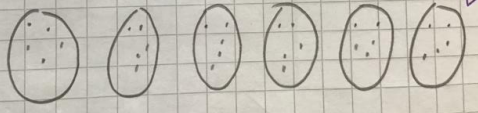


She shares them equally between 6 bowls.

a) Draw a picture to show how Rosie shares the strawberries.

b) How many strawberries does Rosie put in each bowl?

a)



b) She put 5 strawberries in each bowl.

### Flashback 4

- Flashback 4 is taught four times a week and is timetabled across the school from Year 1 – Year 6.
- Flashback 4 are starter activities from White Rose Maths which are used to improve pupil retention of prior learning.
- The four questions on Flashback 4 are based on the following:
  - Q1 is from the last lesson;
  - Q2 is from last week;
  - Q3 is from 2 to 3 weeks ago;
  - Q4 is from last term/year.
  - There is also a bonus question on each one to recap topics such as telling the time, times-tables and Roman numerals

### Counting and Times Tables Facts

- Key facts such as counting and multiplication tables are practised regularly with the aim of automaticity to avoid cognitive overload in the working memory and enable pupils to focus on new concepts.
- Pupils are encouraged to count aloud in multiples relevant to their year group's curriculum. This could be done at the start of maths lessons and also during transition times.
- The school subscribe to Times Table Rock Stars and Numbots and both teachers and support staff have access to it.
- Pupils from Year 1 – Year 6 have their own login details for Times Table Rock Stars and are encouraged to practise both at school and as part of their weekly home learning.
- Pupils in Year 1 are encouraged to use Numbots to develop their understanding, recall and fluency in mental addition and subtraction, so that they move from counting to calculating.
- Times Table Rock Stars is also planned into a separate session daily across Key Stage 2 and each pupil focuses only on the times table relevant to their learning.

### Calculation Policy

All staff follow the school and White Rose calculation policies for written methods for all four operations. This details the progressive concrete, pictorial and abstract methods that are used alongside one another to support understanding.

The implementation of this policy is the responsibility of all teaching and support staff. It is monitored by the mathematics lead and SLT. The policy has the full agreement of the staff, senior leadership team and the governing body.