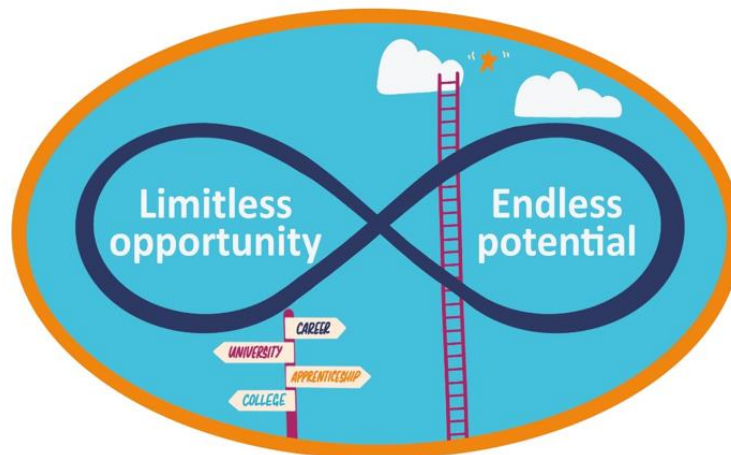


Maths at Warren Primary Academy

Intent, Implementation and Impact



Intent

At Warren Academy we believe Mathematics is vital in everyday life. It is integral to all aspects of life and with this in mind we endeavour to ensure that all children develop a healthy and enthusiastic attitude towards mathematics that will stay with them.

The intention of the maths curriculum at Warren Academy is to equip children with confidence, resilience and a depth of understanding in maths that will underpin and indeed fuel their future learning. We aim to convey the belief to students that by working hard at mathematics they can unlock **endless potential** and that making mistakes is an essential and a valuable **opportunity** for new learning.

Our approach at Warren Academy is underpinned by the principles of Power Maths, as we believe that this approach encourages a deep and connected understanding of mathematical ideas and concepts. We aim for our pupils to achieve mastery understanding through developing their procedural fluency and conceptual understanding.

We know that talking about maths helps embed and develop mathematical thinking and understanding. This aspect of teaching and learning is a particular focus at Warren Academy. In Maths we endeavour to ensure that we deliver language rich **opportunities**, to help the pupils' ability to express their thinking about maths through talk and speaking like a mathematician (SLAM).

At Warren Academy, we believe that all pupils can succeed and achieve in mathematics. Indeed, we believe it to be the right of all students and it is important that all children regardless of their ability or background are given appropriate challenge and **opportunity** to reach their full **potential**.

Aims

The national curriculum for Maths 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.

Implementation

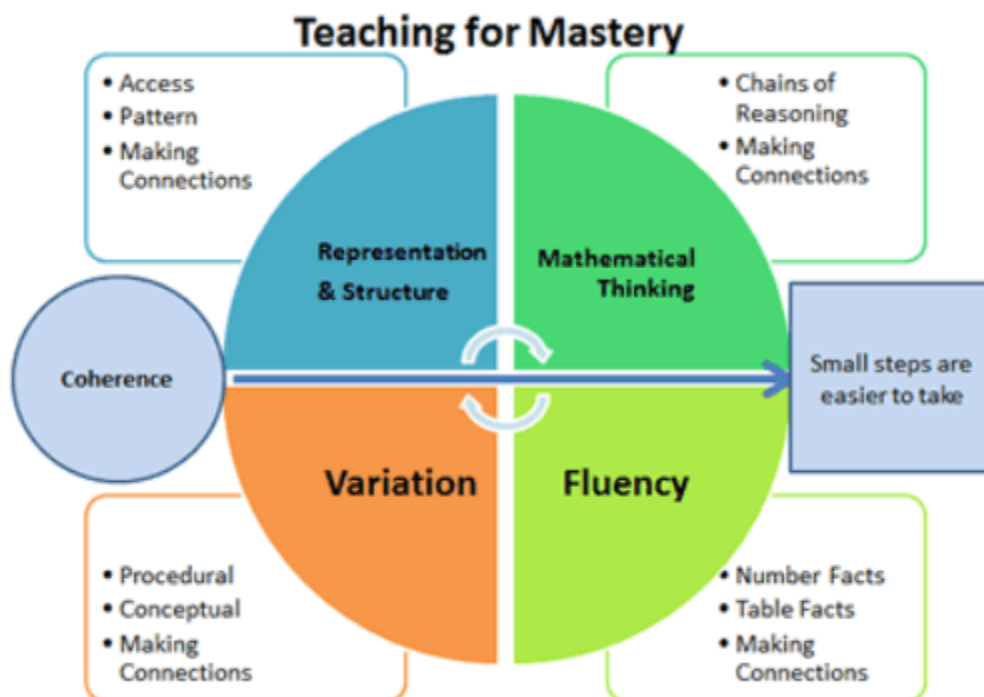
At Warren Academy, our lessons follow a consistent structure designed to provide a framework or structure that teachers use to plan and design their daily lessons to ensure that elements of a good lesson are always included. This familiar structure allows pupils to build confidence and lessens time needed to explain the structure freeing up thinking for the maths.

Our lesson structure is as follows:

Power up – Discover – Share - Think Together– Practice – Reflect

At Warren, we follow the Power Maths scheme and use this to plan and resource every maths lesson around the 5 Big Ideas.

The 5 Big Ideas:



The 5 Big Ideas in Mastery Maths

1. Coherence

- A comprehensive, detailed conceptual journey through the mathematics.



- Connecting new ideas to concepts that have already been understood, and ensuring that, once understood and mastered, new ideas are used again in next steps of learning, all steps being small steps.
- Small steps – the teacher provides the steps but the child takes and connects the steps, reasoning along the way.
- Opportunities for depth.
- Stem sentences to support reasoning.

2. Representation and structure

- Mathematics is an abstract subject, representations have the potential to provide access and develop understanding.
- Varied representations and resources help to build concepts, draw attention to and expose the structure of the concept being taught.
- Moves from concrete, to pictorial, to abstract.
- One of the keys to mastery is exposing structure, however, to stop artificial early success – we often assume that our ‘rapid-graspers’ can already do, so don’t need exposure to such things. In fact it is only through such exposure that they are able to build a deep understanding.

3. Variation

- Conceptual variation draws attention to **what it is**, whereas non-conceptual variation draws attention to **what it is not**.
- Procedural variation draws attention to mathematical relationships and how they are connected through carefully chosen examples, which avoid mechanical repetition. Procedural variation is a careful choice of **what** to vary and careful choice of **what the variation will draw attention to**.
- This deepens their understanding further and allow them to create their own generalisations. This leads to intelligent practice.
- Research suggests that teaching through deliberate variation problems appears to be more effective than teaching through repeated explanations of a definition.
- Tasks should be designed in a way that avoids mechanical thinking so that children do not stop thinking. They should be taught to look for and recognise connections. Questions such as, What’s the same? What’s different? What do you notice?

4. Fluency

1. Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.
2. Key facts such as number facts and times tables must be learnt and practiced regularly in order to avoid cognitive overload in the working memory. This helps students to focus on new ideas and concepts.
3. The ability to recognise relationships/structures and make connections in mathematics.

5. 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.

- Pattern spotting allows pupils to make connections between mathematical relationships, notice the structure and to reason logically. Through this they also develop their ability to explain and convince others of their ideas.
- The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

What teaching and learning looks like at Warren Academy:

Talking:

Mathematical talk allows children to articulate, explain and develop their thinking through discussion and shared thinking.

We encourage students to 'speak like a mathematician' (SLAM) – which is to use mathematical vocabulary accurately and precisely, as well as to speak in full sentences when giving an explanation or answer.

E.g, a pupil would respond to the question, 'What is $3 + 4$?' with '3 + 4 is 7', rather than responding with just the answer '7'.

Vocabulary linked to the current concept is always displayed on the working wall.

Sentence stems and supports are visible on slides to encourage pupils to use full sentences.

Questioning:

We use questions that will help us to assess the students understanding. This is crucial in determining the next steps in planning and in identifying those that require further support and intervention. Knowing this will ensure that we act swiftly in order that all pupils keep up. Good questions also promote a deeper level of thinking which helps the students make mathematical links and connections as well as stimulate curiosity about the maths.

Modelling:

Teachers using the concrete, pictorial and abstract approach (CPA) to ensure that procedural and conceptual understanding are developed simultaneously. It is essential that this process is modelled to children so that they then have the skills to use these independently.

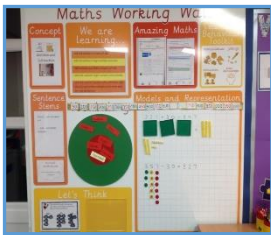
Reasoning:

Emphasis is placed on 'learning' through reasoning, developing multiple strategies and concepts towards understanding. Reasoning through a problem is powerful in helping to embed learning and enables the student to clearly share their thinking. As teachers this is invaluable in assessing a pupils true understanding.

Manipulatives:

In every classroom concrete resources, such as Base 10, Numicon and place value counters, will be used before moving learning into the pictorial and abstract. This allows children to become confident in their use and understanding of the number system. There will also be a range of visuals available such as number squares, multiplication grids and number lines. Different manipulatives are used to show the same concept. This exposes the students to the underlying mathematics so that they understand what is happening and do not become too associated with a particular tool with a particular concept.

Learning Environment



The school aims to provide a mathematically stimulating environment:

- through the use of working walls, that are used regularly during the lessons to support learning.
- through displays that promote mathematical thinking and discussion
- through displays of pupils' work that celebrate achievement

Mindset:

We encourage resilient, curious, collaborative, resourceful mathematicians and celebrate mistakes where they lead to learning.

Children are encouraged to;

- take pride in their work and present it in a way that is neat and can be clearly understood by others.
- work together and build on one another's ideas, challenging their own and others thinking.
- take risks in their learning and be comfortable with taking challenges that extend thinking.
- Reflect on their learning and the learning

Challenge for all:

For those students who grasp ideas quickly, acceleration into new content is avoided. Instead, these students are challenged by deeper analysis of the lesson content and by applying the content in new and unfamiliar problem-solving situations

Organisation of teaching and learning

Mathematical Fluency lessons are daily and last for approximately 15 minutes.

Power Maths lessons are taught daily and last for 60 minutes.

Mathematical Fluency sessions- allow students to rehearse, practice and embed learning of key mathematical facts. Committing key facts, such as number bonds and multiplication tables, to memory is of benefit in enabling students to become efficient mathematicians as it reduces the cognitive load. In doing so, the working memory is then free to enable learning of new content.

- A focus on Key Instant Recall Facts (KIRFs)
- Is separate to the maths lesson.
- Fun, engaging activities
- A fast pace
- May involve some teaching of strategy
- Involves students marking and reflecting on their own learning during the lesson.

Lesson Structure (see also appendix- IWB slides of an exemplar lesson)

Lessons follow a consistent structure (outlined below) designed to provide a framework or structure that teachers use to plan and design their daily lessons to ensure that elements of a good lesson are always included. This familiar structure allows pupils to build confidence and lessens time needed to explain the structure freeing up thinking for the maths.

The structure of the typical maths lesson:

Power up – Discover – Share - Think Together– Practice(with strengthening and deepening) – Reflect

Planning for learning

- Staff follow the Power Maths White Rose scheme of learning to ensure full coverage of the curriculum objectives and year on year progression. The resources offered by Power Maths White Rose are high quality and include the principles that we adhere to and that are outlined in this policy.
- This document is used in conjunction with a range of other useful resources such as Classroom Secrets, White Rose premium resources, NCETM and NRich to provide a rich, comprehensive and varied maths curriculum and extra challenge for those children who are rapid graspers.
- Staff follow the school Calculations policy when teaching written methods.
- Long term plans -The mathematical concepts are taught in accordance with the long term plans completed by each year group.
- Medium term plans- The Medium term plans (Power Maths teacher guide) list the progression of learning (small steps) along with the vocabulary to be used, tools and links.

- Short term plans- All teachers use Smart Notebook to plan lessons alongside their medium term planning.

Special Educational Needs

- Teachers plan lessons so that all pupils can be included and can make progress in the lesson.
- In oral work teachers plan a range of differentiated questions, with some targeted at specific pupils.
- Teachers also ask open questions that allow all children to take part.
- Teachers use a wide range of visual and practical resources to illuminate meaning.
- During whole class teaching, discreet help is given to particular children by teaching assistants where available.
- During activities, children are supported by the teacher or teaching assistant.
- Some children will have an Individual learning plan and a separate L.T. to the rest of the class so that their needs are fully catered for.

Monitoring and Evaluation

Monitoring and evaluation will be carried out by the:

- Head Teacher
- Maths Leader
- Governors

This exercise will entail:

- Monitoring of long and medium term planning.
- Monitoring of short term planning (once half termly).
- Regular classroom 'drop-ins'
- reviewing children's work - 'Book Looks'
- Pupil meetings-
- analysis of test data and papers
- monitoring of assessment and record-keeping, marking
- monitoring of home learning
- staff CPD.
- reporting to governors

Assessment

Assessment is carried out through:

- continual questioning

- observing children at work
- encouraging self reflection
- daily marking of children's work with high quality feedback providing pupils with guidance on how to improve their work.
- planned assessment activities such as NFER termly.
- End of unit checks in which children work in a small group with the teacher to evaluate their understanding of the concepts learned within the unit.

Moderation takes place to ensure consistency of teacher assessments

How assessment is used

- Teachers make and record an end-of-term assessment of each child's 'best fit' against the Age related Expectations for their year group.
- This information is used alongside the tracking of objectives to give each child an assessment judgement. This then highlights any children requiring intervention.
- Attainment is monitored by the teacher and maths leader and Pupil Performance meetings with the Head Teacher are used to identify children that might not have made expected progress and intervention plans are then put into place.

Impact

The impact of Warren Primary Academy's mathematics curriculum is that children understand the relevance and importance of what they are learning in relation to real world concepts. Children know that maths is a vital life skill that they will rely on in many areas of their daily life. Children have a positive view of maths due to learning in an environment where maths is promoted as being an exciting and enjoyable subject in which they can investigate and ask questions; they know that it is reasonable to make mistakes because this can strengthen their learning through the journey to finding an answer.

Children are confident to 'have a go' and choose the equipment and manipulatives they need to help them to learn along with the strategies they think are best suited to each problem. Our children have a good understanding of their strengths and targets for development in maths and what they need to do to improve. Our maths books evidence work of a high standard of which children clearly take pride; the components of the teaching sequences demonstrate good coverage of the 5 Big Ideas for mastery and also fluency, reasoning and problem solving. Our feedback and interventions support children to strive to be the best mathematicians they can be, ensuring a high proportion of children are on track or above.

