

Mathematics at Byfield School:

What is Mathematics? What is a Mathematician?

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.

Mathematicians become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. They can reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language. They 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.

Mathematicians recognise mathematics is an interconnected subject and can move fluently between representations of mathematical ideas. They make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They can apply their mathematical knowledge to science and other subjects.

(National Curriculum 2013)

Children at Byfield School are mathematicians because they develop mathematical fluency:

They develop and consolidate confident recall, basic facts knowledge and strategies / methods (mental and written)

They are able to apply knowledge and skills to show fluency in different ways: concrete, pictorial and abstract

Children at Byfield School are mathematicians because they develop mathematical reasoning:

They can use mathematical language to explain a strategy, method, answer, prediction, idea etc

Reasoning skills are learned progressively (using ladder from Cambridge Maths Hub)

1. Describing: simply tells what they did.
2. Explaining: offers some reasons for what they did. These may or may not be correct. The argument may yet not hang together coherently. This is the beginning of inductive reasoning.
3. Convincing: confident that their chain of reasoning is right and may use words such as, 'I reckon' or 'without doubt'. The underlying mathematical argument may or may not be accurate yet is likely to have more coherence and completeness than the explaining stage. This is called inductive reasoning.

4. Justifying: a correct logical argument that has a complete chain of reasoning to it and uses words such as 'because', 'therefore', 'and so', 'that leads to' ...
5. Proving: a watertight argument that is mathematically sound, often based on generalisations and underlying structure. This is also called deductive reasoning.

Children at Byfield School are mathematicians because they develop mathematical problem solving:

They develop different problem-solving skills such as: Working systematically, Trial and improvement, Logical reasoning, Spotting patterns, Visualising, Working backwards, Conjecturing (Cambridge Maths Hub)

They have resilience and a positive mindset to work at a problem and find ways to solve it, seeing the value in the effort and the achievement in the learning.

We cover the full national curriculum for Maths and use White Rose to ensure we cover a broad and balanced curriculum.

We teach the children of Byfield School to be a Mathematicians by becoming fluent in the fundamentals of mathematics, being able to reason mathematically and solve problems by applying mathematic skills.

Progression across mathematics topics and year groups is mapped using White Rose National Curriculum Table of Progression for Mixed Age Classes.

<https://whiterosemaths.com/wp-content/uploads/2019/11/National-Curriculum-Progression-Mixed-Age.pdf>

How do we cater for children who are more able in Mathematics?

What We Believe	Provision
<p>The characteristics of a More able pupil:</p> <ul style="list-style-type: none"> • Have a secure subject knowledge and can recall it quickly • They work systematically, • They are able to come up with their own solutions to problems, and use their knowledge to think creatively • Are able to work with a wide range of children being good leaders or team members • Are able to apply that subject knowledge in a range of different contexts • Are able to communicate their understanding efficiently. • Are able to use reasoning skills (not just in maths but across every subject) to construct sound explanations and arguments based on secure subject knowledge • Are able to analyse, evaluate and create (Blooms Taxonomy) drawing from good subject knowledge. • Children are able to self-check, identify mistakes more independently and edit and improve their work. • Use Enquiry skills 	<p>Teachers assess children's knowledge and vocabulary– and ensure this knowledge is complete and quick.</p> <p>Challenges designed to reason, explain, evaluate, problem solve and create.</p> <p>Opportunities are built in for them to work with other more able children, but also in mixed ability groups.</p> <p>Challenges are designed so that they are more open ended – to encourage creative solutions and systematic working.</p> <p>Teachers adapt their marking to provide additional challenge through giving the children opportunities for reasoning, evaluation, editing and communicating their learning.</p>
<p>Opportunities for More Able</p> <p>More able children need opportunities show they have a deeper level of understanding.</p> <p>Blooms Taxonomy states the higher level thinking is through analysing, (breaking down information into component parts), Evaluating (judging the value of information or ideas) and Creating (combining parts to make a new whole)</p> <p>More able children should have the opportunity to communicate, present and produce work for an audience.</p>	<p>Children have open-ended tasks which they are expected to analyse, evaluate or create.</p> <p>Opportunities are built in so children that are more able produce work for a specific audience – for example producing letters, presentations or displays to communicate their knowledge.</p> <p>Children take part in inter-house competitions for Mathematics – using recall, investigating, reasoning and problem-solving skills.</p>
<p>Errors and Misconceptions:</p>	<p>Growth mindset is taught to all children – and the language used for marking is green for growth – this could be to correct a mistake more move onto harder challenge.</p>

<p>More able children may struggle with getting things wrong and like all children need to be taught a growth mindset.</p> <p>Being able to identify mistakes and self-correct or edit is a characteristic of a working at a deeper level within a subject – however this is something which needs to be taught and practiced.</p> <p>More able children have accurate and quick recall of knowledge and shouldn't be making consistent mistakes in foundational learning if it is secure – if they are making lots of mistakes this shows a gap in their understanding and it needs to be addressed. Likewise if this is not quick, it shows a gap which needs to be addressed.</p>	<p>Self and peer marking and editing is part of everyday teaching practice.</p> <p>Children will still have access to full foundational learning (for example times tables, grammar) but will be expected to be quick and accurate. If it is not, quality first teaching will be used to address this.</p>
<p>More able children still need to be taught a full broad and balanced curriculum</p> <p>Pupils are often labelled as Maths marvels from an early age because they are quick to learn, apply facts and algorithms, and can work speedily through a series of questions.</p> <p>Historically this 'G&T' labelling resulted in a child being pushed forward far too quickly and missing out on a completely rounded Maths curriculum. This can often be the case for other subjects.</p>	<p>Ensure that before children move onto a challenge – they are secure in the foundational skills and have the complete knowledge of the curriculum for their age group.</p> <p>Formative assessment is used effectively to identify what needs to be taught and what knowledge is already in place.</p>

How do we cater for SEND in Mathematics?

What we Know / What we believe	Provision
At Byfield we believe the importance of maintaining an inclusive learning environment	SEND children still have 100% access to maths lessons – they are not removed for interventions unless there are specific interventions which are assessed to address a crucial learning need which would prevent them from leading a successful and rewarding life.
Some children may need differentiated adaptations to be made – so they can access the same learning.	Teachers adapt and design learning so that it means children can access the next step of learning. Children are able to access concrete equipment, number cards etc to aid learning. Classroom Secrets and Twinkl are used to provide differentiated learning and appropriate challenges.
Maths is a vocabulary-rich and vocabulary dependant subject – SEND children who struggle with retaining vocabulary need extra support.	Key vocabulary is explicitly taught – with time for consolidation. Key words are explained and used repeatedly to ensure they are memorable. Key words are displayed – either on board during lesson or on displays.
Maths requires knowledge to be 'sticky' – children need to recall basic facts (arithmetic) and remember learning to build on knowledge and apply / inter-connect from one lesson / topic to the next. – SEND children who struggle with memory retention will need extra support and experiences to link knowledge / skills to.	Lessons are planned so they are progressive, and knowledge from one lesson is built upon in the next. Teachers train children to recognise where skills taught before are being used / applied to learning (making connections across topics) Arithmetic skills, number facts (KS1) and timestables (KS2) are practised daily.

Assessment

What we Know / What we believe	Provision
Formative	Cold tasks are used at the start of a topic Children are given a breakdown of the I Cans that they will be looking at during a topic Children assess themselves against the I Cans Hot task assessment used to the end
Summative	Opportunities are sought to constantly assess children's understanding throughout a lesson – through talk partners, hands up/ hands down, quick fire questions and group work Children and teachers tick TILTs Challenge, booster and next step strategies are used as appropriate to consolidate / move on / challenge Planning is flexible to react to children's learning needs

Pedagogical Approach – Inspire, Challenge, Succeed

What we Know / What we believe	Provision
Inspire	Use of different teaching strategies including concrete equipment, pictorial representations, bar models, mental jottings and written methods so children feel safe and inspired to show their thinking in different ways Pupils are inspired by different challenges and learning opportunities such as investigations, pattern-finding, real-life mathematics and applying skills.
Challenge	Classroom Secrets and Twinkl are widely used to help provide differentiated challenges in inclusive lessons. Children are able to progress during the lesson moving up through learning steps – Bronze, Silver, Gold, Platinum or, 1,2,3 stars (Twinkl) or D, E, GD (Classroom Secrets) Additional challenges, extension opportunities are used as appropriate and can be seen in the marking by an arrow. KS2 use Mastery Menus for More Able pupils to independently display deeper understanding.
Succeed	Different strategies are used to help children to reflect on their learning. We reflect on the learning journey and improvements rather than getting things right / wrong. Children are rewarded for good maths skills and effort regardless of right/wrong answers Strategies include: Self and Peer marking Working as a group Reflecting on how they have developed / improved Applying skills to problem solving
Mapping	KS1 – number bonds and facts are practised daily KS2 – arithmetic skills are practised daily and all skills are repeated throughout the year These skills have been taken from National Curriculum and identified as basic skills that are needed to “stick” in order to be applied across different mathematics topics Topics are mapped through White Rose overviews and adapted by teachers to suit term times and prioritise (eg, Yr 2 and Yr 6) Calculation Policy
Skills Progression is needed to apply knowledge	White Rose – progressive planning What reasoning looks like across classes What problem solving looks like across classes What vocabulary should be used across classes Daily arithmetic Daily number facts / times tables practice

SMSC

What we Know / What we believe	Provision
Spiritual	Sense of achievement from recognising progression and improvement in FAST maths
Moral	
Social	Sense of belonging working in pairs and groups Valuing others and their contributions
Cultural – Including Cultural Capital	