

Curriculum: Mathematics



“The powerful thinkers are those who make connections, think logically, and use space, data, and numbers creatively.”

Jo Boaler

Why do we learn Mathematics?

Mathematics is a creative and highly inter-connected subject 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.

What are the aims of our Mathematics curriculum?

At Werrington Primary School, we strive to provide high quality teaching and learning of maths that allows all children to develop a deep understanding of the concepts they are learning.

This vision can be broken down into five key aims:

- The key principles of maths mastery are skilfully embedded across all phases of the school.
- A deep and durable curriculum has been expertly designed to give our children the best possible start to their maths education by building self-belief, high-aspirations, creativity, resilience, knowledge and a strong foundation that lasts a lifetime. This curriculum is designed using resources and materials from the NCETM.
- The teaching and learning of maths is cohesive and progressive and enables children to make connections between prior knowledge and new learning with clarity.
- Children's thinking is challenged in a variety of different ways; problem solving and reasoning are at the heart of this.
- Children love maths, teachers enjoy teaching it and all stakeholders acknowledge the importance of the subject.

What do we learn about in Maths at Werrington Primary School?

Curriculum Domain	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number and place value	✓	✓	✓	✓	✓	✓	✓
Addition and subtraction	✓	✓	✓	✓	✓	✓	✓
Multiplication and division	✓	✓	✓	✓	✓	✓	✓
Fractions		✓	✓	✓	✓	✓	✓
Decimals					✓	✓	✓
Percentages						✓	✓
Ration and proportion							✓
Algebra							✓
Measurement	✓	✓	✓	✓	✓	✓	✓
Properties of shape	✓	✓	✓	✓	✓	✓	✓
Position and direction	✓	✓	✓	✓	✓	✓	✓
Statistics			✓	✓	✓	✓	✓



Mathematical mindset

Everyone has a 'mindset' – an idea about ability and potential. Different mindsets have associated behaviours that have a huge impact on learning and achievement. At Werrington Primary School, we encourage our children to have a 'growth mindset'. Those with a growth mindset believe that achievement increases with hard work and that everything they learn makes them more knowledgeable. They will also persist longer on problems, relish challenge and learn from mistakes whereas those with a fixed mindset give up easily, avoid challenging problems and dislike making mistakes. Fortunately, there are certain actions we can take to nurture a growth mindset in our children, in and out of school.

Make maths fun!

Like everything, if it's fun, it is much more appealing, and maths is no different. There are lots of puzzles and games that help with maths development, many of which people often already have at home. For example, games like snakes and ladders, Ludo – anything with a dice really – will help children enjoy maths, and develop number sense, which is critically important. Even games like 'Guess Who' develop logical thinking. 3D play is also very important – building blocks (or simply building anything), modelling clay or activities like baking have really positive effects. Ultimately, raising the profile is vital as maths is everywhere, waiting to be explored and enjoyed.

Growth mindset

Growth mindset is at the heart of our school ethos. It is really important that children know that being good at maths is all about working hard rather than it being some natural ability or gift. We would encourage all adults to be conscious of the praise they direct towards children: rather than call them 'smart' or 'clever', celebrate their hard work, perseverance, resilience, the connections they made, their thinking or their creativity.

Slow down!

We want our pupils to develop a deep understanding of maths – not just recall a selection of memorised facts. As long as they are working hard and trying their best, the speed at which they work is irrelevant. As a school, we are striving to slow down our teaching and learning of maths in order to achieve deep and durable understanding. We want all of our pupils to embrace challenges, struggle with problems yet still stick with it when things get tricky – we even want them to make mistakes. Forcing children to work quickly on maths is one of the ways to start maths anxiety for children. When we emphasise speed, we discourage deep thinking. One of the reasons for this is that the stress caused by time pressure can cause mental blocks, making performance worse. Furthermore, mathematicians who rely on memory tend to be amongst some of the lowest attainers.

Make connections

A crucial aspect of our maths philosophy is making connections. Maths is a hugely interconnected subject rather than a collection of isolated concepts and it is important for children to realise this: not only can it make them feel more confident, they can usually use knowledge that they do know to find out what they don't know yet. As part of our approach, we use equipment and images a lot all the way through school so children can really explore the structure of the maths they are learning about. Essentially, a lot of maths concepts don't change in structure – we just learn to use and apply it in more sophisticated ways.

Mistakes are important

People with a fixed mindset find it hard to deal with mistakes. So does a child who has been labelled as 'smart' or 'clever', as when children fail at something – which they all will at some stage – they will inevitably conclude that they aren't smart after all. At Werrington, we celebrate mistakes, view them as fantastic learning opportunities and realise we can learn an awful lot from them.

Parental attitudes

Every individual has their own feelings towards maths and some people's, sadly, aren't going to be positive. However, it is crucial that parents don't share stories of maths failure or dislike towards the subject. A recent study from 2015 showed that as soon as mothers say to their daughters 'I wasn't good at maths at school', their daughter's achievement went down. Furthermore, parents shouldn't worry if they cannot do their child's homework – whatever the reason might be. Another study has shown that parents' understanding of maths does not affect their child's chances of succeeding in the subject. Instead, ask them to explain their thinking to you – this can be one of the most encouraging experiences a parent can give their child. When children are explaining their thinking, they are learning it at a much deeper level.

An example of progression: Subtraction

Year 6

Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
Perform mental calculations, including with mixed operations and large numbers.

Year 5

Subtract whole numbers with more than four digits, including using formal written methods (column subtraction)
Subtract numbers mentally with increasingly large numbers.

Year 4

Subtract numbers with up to four digits using the formal written method of column subtraction where appropriate.
Estimate and use inverse operations to check answers to a subtraction calculation.

Year 3

Subtract numbers mentally, including a three-digit number & ones; a three-digit number & tens; a three-digit number & hundreds.
Subtract numbers with up to three digits, using formal written methods of column subtraction.

Year 2

Subtract numbers using concrete objects, pictorial representations, and mentally, including a two-digit number & ones; a two-digit number & tens; two two-digit numbers.

Year 1

Read, write & interpret mathematical statements involving subtraction & equals signs; represent & use subtraction facts within 20.
Subtract one-digit and two-digit numbers to 20, including zero.

EYFS

Say which number is one less than a given number.
Using quantities and objects, subtract two single-digit numbers and count on or back to find the answer.

