

MATHEMATICS

Our vision:

*Mathematics is part of our **core** discipline and is a universal language that enables understanding of the world. Beyond the study of numbers, shapes and patterns, it also provides important tools for work in fields such as engineering, physics, architecture, medicine and business. It nurtures the development of a logical and methodical mindset, as well helping to inculcate focus and the ability to solve all manner of problems.*

Throughout their time at Woldgate School, children will develop **mastery, resilience, and numeracy** through study of the elegance, logic and purity of mathematics.

Everything you do in mathematics should be worthy of great merit, character, and value.

<p>Of great merit: MASTERY</p>	<p>Mastery forms the basis of the teaching philosophy in mathematics at Woldgate School. It involves the process of revisiting, re-embedding, re-casting and revising the bedrock principles behind the key topics – rediscovering how prior learning illuminates the task at hand and helps to structure the concepts yet to come.</p> <p>It is based on five key elements:</p> <ul style="list-style-type: none">• Coherence• Representation• Variation• Fluency• Mathematical Thinking <p>To find out more, please see this summary from The National Centre for Excellence in the Teaching of Mathematics.</p>
<p>Of great character: RESILIENCE</p>	<p>Our department helps pupils to gain enjoyment in Mathematics through a growing self-confidence in their ability. Through careful pre-teaching and assessment, teachers identify areas for development for each class and each child and award resilience awards at the end of each week to recognise where pupils have overcome a misunderstanding, mastered a new skill, or show courage in problem solving.</p> <p>Pupils are more likely to develop a positive attitude towards mathematics if they are successful in it, especially if they are aware of their success.</p> <p>JPJ Van der Beek, SHG Van der Ven, EH Kroesbergen and PPM Leseman: 'Self-concept mediates the relation between achievement and emotions in mathematics', in 'British Journal of Educational Psychology', Volume 87, Issue 3, 2017, pages 478 to 495.</p>

Of great value:

NUMERATE

Numeracy is essential for adult life but is also the lens through which the beauty of mathematics can be appreciated. Children take nationally standardised numeracy and mathematics tests throughout upper and lower school. Results of these, including specific targets for each child, are posted home to parents. Children who are identified for intervention as a result of these tests will either receive additional small group tuition during the school week or take part in our adaptive online learning programme. We also provide challenges for our more able mathematicians through our morning enrichment programme. Our numeracy co-ordinator, Mr Gibson, is happy to provide details of these schemes.

Our teaching:

The teaching of mathematics at Woldgate is built on the concept of mastery. It recognises that there are three key aspects of learning in Mathematics that children need to be successful. Firstly, **declarative knowledge** – the part that allows children to say **“I know that...”** This relates to the facts of mathematics: the understanding of concepts as simple as multiplication and division to ratio and proportion. This is their mathematical toolkit.

As a result, **in the sequence of our teaching, we look back at the mathematical understanding children have gained to keep it fresh and focused** (through our “last lesson, last week, last term” approach) but also at the end of each lesson look forward to the next lesson in the sequence to make sure children have the right tool for the work they will undertake.

The next stage is our **procedural knowledge** – the **“I know how” aspect of the subject**. This focuses on the mathematical methods: **how the tools they have learned can be put to work**. We teach older pupils efficient, systematic and accurate mathematical methods that they can use for more complex calculations and in their next stage of learning. We encourage pupils to use core mathematical methods rather than resort to guesswork, cast around for clues or use unstructured trial and error.

Finally, the **conditional aspect** of the subject – the **“I know when.”** Mathematics is, after all, about problem solving and in this stage of our teaching, **our maths department ensure pupils experience success in solving word problems by sequencing the teaching of strategies** to ‘convert’ the deep structure of word problems into simple equations.

Our curriculum

What **knowledge** will children learn in mathematics?

At its most basic, content of mathematics curriculum in Lower School focuses on the development of knowledge in:

- Number
- Algebra
- Geometry
- Statistics,
- Probability
- Ratio And Proportion

These concepts are then extended at GCSE level.

In mastering these concepts, children will become **fluent** in the fundamentals of mathematics. Through frequent practice - with increasingly complex problems - children will develop conceptual understanding and the ability to recall and apply knowledge accurately.

The key aspect of a strong maths curriculum is the way that these are developed into a toolkit in which children can independently choose the right function or the right method to solve a particular problem. A key part of this is to prompt them to think like mathematicians and **reason mathematically**. This involves teaching children to reason mathematically by following a line of enquiry and developing an argument, justification or proof using mathematical language. This is more than just asking them to explain and understand how to solve a problem – though that is a key aspect - but rather it is about getting them to deduce, test conjectures, explore and infer, and make connections. In order to develop this, our department uses the mastery method of delivering mathematics.

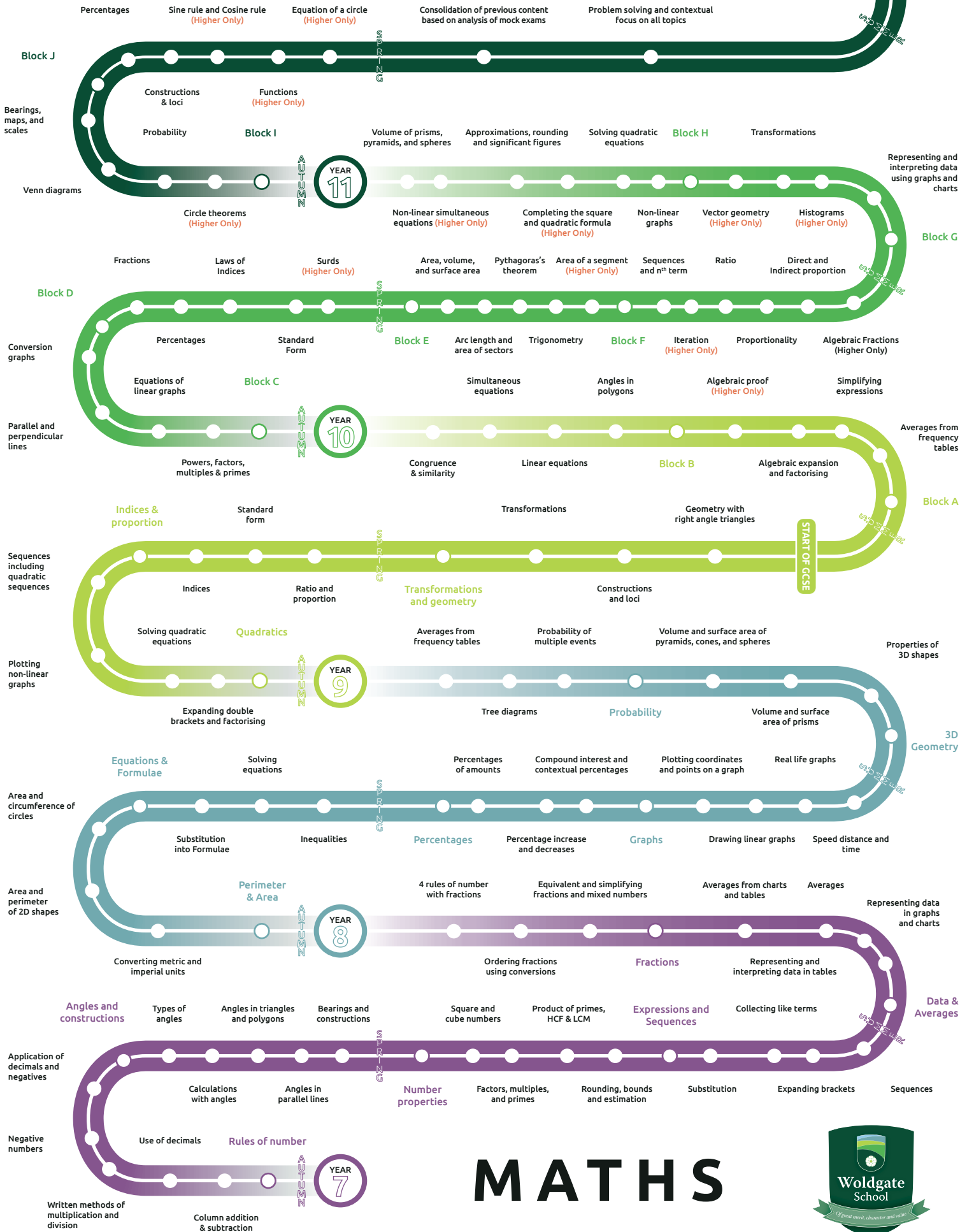
Even if they don't become mathematicians, our children will encounter mathematics in everyday life – but very rarely as equations on a page. Instead we find ourselves confronted with problems, questions, and calculations that are woven into choices, challenges, and more complex tasks. As individuals - alive to number – we need to learn to move freely between different numerical, algebraic, graphical and diagrammatic representations. The key to an effective mathematics curriculum is the way that children learn to apply these concepts independently, seeing their connections and developing confidence. This in turn will allow them to **solve problems** by applying their mathematics with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

While you may also wish to read the [National Curriculum for Mathematics](#) and our department's detailed [long term planning document](#), this knowledge forms the following **learning journey**:



GCSE EXAMINATIONS

3 papers – 1 non-calculator and 2 calculator papers



MATHS



Why do we **sequence** the curriculum in this way?

The mathematics curriculum at Woldgate School is based on a careful selection, sequencing and linking of declarative, procedural and conditional knowledge.

Pupils need to systematically acquire core mathematical facts, concepts, methods and strategies to be able to experience success when problem-solving and in order to become proficient mathematicians. Consequently, our curriculum is carefully sequenced to show pupils new and consistent patterns of useful information – for example, using our last lesson, last week, last term prepare tasks. These then form the basis of further concepts, rules and principles that pupils can store in their long-term memory.

Problem-solving requires pupils to hold a line of thought. It is not easy to learn, rehearse or experience if the facts and methods that form part of a strategy for solving a problem type are unfamiliar and take up too much working memory. For example, pupils are unlikely to be able to solve an area word problem that requires them to multiply 2 lengths with different units of measurement if they do not realise that the question asks them to use a strategy to find an area. Therefore, the initial focus of any sequence of learning should be that pupils are familiar with the facts and methods that will form the strategies taught and applied later in the topic sequence. This forms a key part of our mastery curriculum.

As a simple example, a pupil can better understand connections of number and the concepts of addition and quantity if they have declarative knowledge of number bonds and procedural knowledge of column addition, which both reinforce each other. In terms of curriculum sequencing, pupils are able to retain knowledge and ability to use core methods when teachers take a mastery-led approach to teaching and rehearsing concepts and core methods.

Our assessment

The curriculum is sequenced carefully through our mastery approach so that relevant existing knowledge is secured through frequent assessment in lessons as part of our 'prepare' activities at the start of each lesson. For each unit, new content is delivered sequentially in increasing difficulty but is segmented into components that are assessed through interim tests so that misunderstandings and errors can be picked up progressively as children progress through that topic.

Once all content in a topic has been delivered, a final sequence of lessons consolidates the learning with problem-solving activities that revisit, challenge, and combine with prior topics in order to secure understanding. A final end of topic test takes place at the end of each unit. At Key Stage 3 we use GL Assessments throughout the year to check long-term retention of the curriculum and to validate our teacher assessments.

How families can support:

Ensure your child has the correct equipment, including a scientific calculator which they should bring to every lesson

Encourage the use of Maths websites to consolidate pupils' learning in lessons, and to support homework where necessary. A useful website is www.mymaths.co.uk. All pupils will be informed of how to logon to this website when they join the school.

Checking homework is completed on time by encouraging your child to attempt homework on the night it is set.

Encourage your child to seek help from their class teacher if they do not understand the class work or homework, or use the drop-in clinic at the start of lunch-time (Monday to Thursday).

Encourage them to use maths in daily life.