THE BRITISH SCHOOL
OF NANJING
A NORD ANGLIA EDUCATION SCHOOL

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Mathematics Curriculum Overview
Key Stage 3 -Year 8

Students continue their journey of discovery in mathematics. This is done through an accompaniment of teacher-led learning, project-based learning and student-led discovery. Students use a mixture of mathematical software where possible and gain experience using a calculator in mathematics. They get taught problem-solving techniques and apply computational thinking to problems where possible in the form of algorithmic approaches. This is all accompanied by a focus on mathematical rigor, alongside an emphasis on appropriate use of mathematical vocabulary and associated spellings. Students are also exposed to mental strategies throughout the year, as well as frequent exposure to mental mathematics – to aid in not only mathematical vocabulary but listening to mathematics in English.

During Year 8, students further reinforce their knowledge of number and move to look at applying their knowledge of number to algebra.

Number
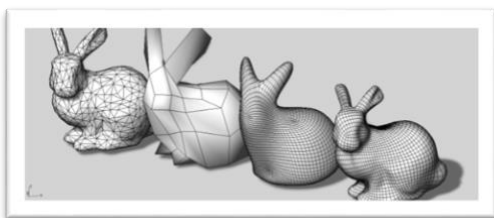
Students revisit numeracy facts and techniques, they have been taught throughout senior school. Students begin with reinforcing their knowledge of the applying the four operations $(+, -, \times, \div)$. Students then look at laws of indices including multiplying, dividing and raising to a power. Some students may go on to look at negative indices and exploring the reciprocals of numbers. Moving on students look at standard form/scientific notation and converting numbers between this form and ordinary representation. Students perform calculations with numbers in standard form including multiplying and dividing, with some students looking at adding and subtracting in standard form. Students review rounding to significant figures and performing rounding to estimate calculations. Students review fractions and performing the four operations with fractions alongside converting fractions to percentages and decimals again. Students then move on to reviewing percentages of amounts and using a calculator and multiplier. Students then review percentage increase and decrease alongside simple interest; some students will go on to look at compound interest and looking at how to find prices before and after percentage change.

Shape & Space
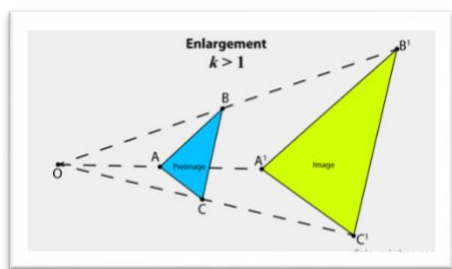
Students learn more accurate and sophisticated vocabulary describing shapes and solids and their properties. Students will review the formulae for triangles and quadrilaterals alongside finding the area and perimeter of compound shapes. Students then move onto finding the area and circumference of circles and see visual demonstrations of where these formulae come from. Then students look at categorising different 3D, such as platonic solids, prisms and spheres and look at finding the volume of these shapes, some students will look at finding the surface area.

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Additionally, students will discover Pythagoras' Theorem and the proof of this, as well as some students going to apply this not only in two-dimensions but three dimensions too. Students will then review interior and exterior angles of polygons ensuring they can apply the formula appropriately and problem solve with this, they further extend this to angles in parallel lines and look at the proof of these rules, as well as building confidence in their mathematical reasoning and arguments. Alongside shapes, students also review transformations and further extend this to include enlargements, with some students looking at negative enlargements, all on the Cartesian plane. We also cover tessellations, and students design their own tessellations. Students will also look at plotting straight line graphs using a collection of points from either a table or an algebraic relationship – they will apply their knowledge of reading graphs to read conversion graphs and use this to convert currencies and read distance-time/distance-speed graphs.

Algebra
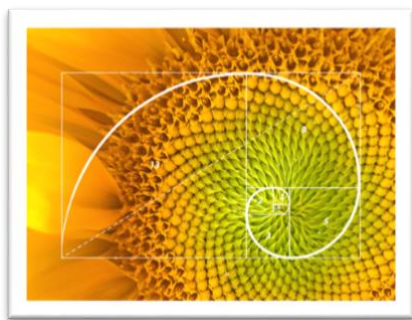
Students review their algebra from previous years such as simple index laws using algebra and simplifying algebraic expressions by collecting like terms. Students will then move on to expanding single brackets with either a constant or variable at the front and basic factorising into a single bracket. Students then focus on solving simple linear equations, some students will move onto solving multi-step equations that require expanding or factorising. They will then move on to situations that require the forming of equations such as perimeter and area of shapes or angle problems (as opposed to a trial and improvement approach). Students then review their studies of formulae and using this to explore the relationships between mathematical objects. Some students may go on to learning to rearrange formulae. Students will revisit sequences, and some will learn to derive the formula for an arithmetic sequence.

Data
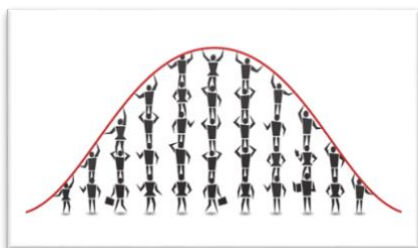
Students look at collecting data and how we represent data appropriately given both the quantity and the type of data collected. Data collection takes the form of tallies, frequency tables and questionnaires for different types of data. We then review representations of data in the form of pictographs, bar graphs and scatter graphs. Students build more sophisticated tools to look at these graphs and build more vocabulary to explain relationships between sets of data – such as correlation and causation. Students review the different types of average and learn to reason which is the most appropriate for the data and identifying problems with the different types of averages. Students are then introduced to probability formally, firstly by looking at the probability scale and then using a formulaic approach. Students investigate probability and learn to hypothesise their expected results; this is how they are introduced to theoretical and experimental probability. Some students go on to look at multiple events in probability and explore this via the use of sample spaces, two-way tables and tree diagrams.

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Technology

Students will learn through a myriad of digital mediums. Students will become proficient in their use of Microsoft Teams, OneNote, Outlook and the Office packages including Excel. Students will explore and investigate mathematics using mathematics specific software such Geogebra and Desmos where possible. Alongside this, students will continue to gain confidence in the use of a scientific calculator and improved dexterity and speed in calculating. We also use MyiMaths and Dr Frost Maths for students to practice fluency problems and so that students can receive instantaneous feedback alongside additional teacher feedback when appropriate.

Recommended resources for Deeper Understanding

MyiMaths, a service we often use to assign homework. All students have a log in and can access any task from KS3 to KS5. We suggest students review classwork on here. https://www.myimaths.com/

Dr Frost Maths is an additional service that focuses on exam-style questions. Students can also access this and will be given a log in if they desire. https://www.drfrostmaths.com/

Mathtrainer is a website for students to practise their basic understanding of four operations, the website acts like an app and saves their scores. We recommend this for frequent practise. https://www.mathtrainer.org/

Complete Mathematics Timestables are fantastic for students to practise their timetables. They include different tasks as opposed to classic calculations such as arrays and recognising division facts.

https://completemaths.com/teaching-tools/digital-manipulatives/timestables

Applications for Students

The British School of Nanjing
Mathematics and Computer Science Department
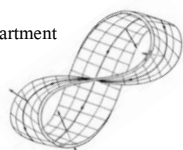
Sumaze! is a series of educational puzzle apps developed by MEI (Mathematics Education Innovation). A phone/tablet app available in four different versions depending on students' age. https://sumaze.mei.org.uk/

Geogebra applications. A collection of Geogebra features are available for download on a mixture of devices. A personal favourite of ours is the 3D calculator – students can use AR (augmented reality) to plot 3D objects around them. https://www.geogebra.org/download?lang=en

Desmos. A beautiful and simple graphing calculator for students to explore functions and more, its often updated with new features and extends to some unusual, weird and funky functions. https://www.desmos.com/

Euclidea is an elegantly designed app for students to explore constructions using a straight-edge and pairs of compasses, all performed on their device. https://www.euclidea.xyz/