



Newport Girls' High School Curriculum Summary

Faculty: Mathematics and Technology	Subject: Mathematics
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Our Vision

Faculty Vision

The Mathematics and Technology Faculty comprises of the subjects: mathematics, further mathematics, computing and design technology. Our aim is to work together to create and develop learners who are equipped to succeed in this modern technological world. Throughout their time here they will evolve their mathematical and logical understanding and appreciate the importance of accuracy and rigour. They will enhance their creativity to solve problems be it in a practical environment or in theory. We will help foster their love of STEM subjects by creating a learning environment where students feel appreciated and valued and are given opportunities to thrive.

Subject Vision

In Mathematics we aim to harness student's love and enjoyment of the subject by allowing them frequent opportunities to demonstrate their abilities through such ways as problem solving, paired working and discovery. We want to develop student's ability to think logically and accurately and to be able to confidently solve problems in unfamiliar contexts and demonstrate their ability to communicate ideas fluently. They will be provided with skills that will not only help them succeed in mathematics but also in other subjects as well as outside the classroom.

Curriculum Intent

At KS3, our aim is to develop students' ability to solve problems by improving and increasing their mathematical skill set giving them regular opportunities to challenge themselves and apply their knowledge in varying contexts. We want our students to enjoy the subject and appreciate the importance and application of what they are learning and its usefulness outside of the classroom. The curriculum will show how ideas can be generalised and proved or disproved and will encourage students to make discoveries which helps strengthen the links between the abstract and real life. We follow the national curriculum but also give our students the chance to exercise their mathematical prowess in the Junior Mathematical Challenge as well the Team Maths Challenge.

At KS4, we study the OCR syllabus for Mathematics. There is also an opportunity afforded to students to study the AQA Level 2 Further Mathematics qualification, which provides challenge but also helps consolidate complex skills and techniques that are seen in the mathematics GCSE. It also provides an insight to the standards and requirements of A level mathematics, allowing students a much more informed decision. Over the course of KS4 we aim to develop student's ability to think independently and select and apply appropriate mathematical techniques to solve a problem. We want to encourage students to reason mathematically and make logical conclusions and deductions – an important skill set needed for other subjects regardless of whether the student continues to study mathematics at a higher level.

At KS5, students continue to study the OCR syllabus to provide continuity to their learning. Our students will extend their range of mathematical skills and techniques and crucially develop a much deeper understanding of how different area of mathematics are connected. We want students to use their mathematical knowledge to solve problems in a variety of contexts. We place a strong emphasis on accuracy and rigour which not only helps solve mathematical problems but also provides supports other subjects such as the sciences when conducting analysis of their experiments. We prepare our students for the needs of higher education as well as functioning adults in society by improving their use and application of technology, such as with calculators and computer programs, which can be particularly useful tools for interpreting and analysing statistics.

Curriculum Sequencing Rationale & Implementation

The order in which topics are taught in mathematics are designed to create a spiral learning approach to the knowledge and skills students need in order to gain a solid foundation in which we subsequently build on throughout the respective course.

KS3:

The curriculum aims to build on the knowledge and processes learnt at of Key stage 2 with a strong focus on algebra, number, statistics and geometry which are underpinned by our national curriculum.

An overarching theme towards mathematics during Y7 to is encourage and develop problem solving and being able to discover ideas and connections for themselves. In Year 7 fundamental ideas are that are to key being successful in mathematics are established or consolidated early. These include working with different types of numbers such as fractions, decimals and percentages through to algebra. During the autumn term there is a strong emphasis on students developing their ability to use algebra including the basic premise and techniques to generalising patterns. This skill is important to harness early as success later on in year 7 relies on it heavily where students have to set up and solve equations or have to prove statements. There is an increased emphasis on working collaboratively and students are actively encouraged to discuss mathematical concepts. In year 8, there is a stronger emphasis on learning more core content with many new concepts and techniques introduced in readiness for developing these ideas further at GCSE. Topics introduced in year 7 continue to be developed as well for example, students are unable to master the skill of solving simultaneous equations in year 8 without knowing the strategies for solving single linear equations that they learn in year 7.

KS4:

Having completed the full KS3 national curriculum by the end of Year 8, students commence GCSE courses in Year 9. At KS4 we build upon many of the concepts and methods that were introduced at KS3. A fundamental skill our students learn at KS4 is the ability to make links between topics, and to be able to solve multi layered problems. Opportunities to challenge their problem-solving ability are populated throughout the course but becoming more frequent towards to the latter end as their knowledge of the content becomes more secure. The content is covered in a way that has 'natural flow' while still providing students variety. For example, in the topic sequences, students build on their learning of linear sequences from KS3 and extend this to other more complex sequences such as quadratic, geometric and Fibonacci at KS4. Another topic introduced at KS3 is quadratic expressions where students are required to expand double brackets and factorise whereas at KS4 we develop this idea to include solving quadratic equations and its significance relating to graphs and real-world applications such as kinematics. The curriculum has been sequenced in such a way that the more complex and high-grade topics such as equations of circles and tangents or transformations of graphs are covered towards the latter part of the course to ensure that they have all the pre-requisite skills such as applying Pythagoras' theorem and trigonometry have been firmly established.

KS5:

The KS5 curriculum has been designed to support students initially with their transition to A level with topics such as indices and surds as well as quadratic equations where ideas covered at GCSE are consolidated and extended. Students are also introduced early to key ideas and concepts that are fundamental to much of the pure content throughout the rest of the course such as those involving calculus and trigonometry, which enables students to establish links quickly and firmly. Although our students do not generally sit the AS examinations our curriculum sequencing does follow the 'year 1' topics first before moving on to the 'year 2' topics in the A level specification. Students are introduced to the applied aspects of the course (mechanics and statistics) at the beginning of the spring term as that enables the autumn term to focus solely on the pure aspects and establish solid foundations which can later be utilised during the applied areas. The course has also been designed with the close consideration of the further mathematics A level in mind with much of the pre-requisite knowledge covered before it is needed, for instance forces and motion learnt in year 1 mathematics is developed in further mathematics in year 2 through circular motion, also integration techniques covered in mathematics are built upon in further mathematics to include hyperbolic and inverse trigonometric functions. In year 2 many of the ideas introduced in year 1 are built upon quite substantially namely calculus. We ensure that the differentiation and integration

teaching is interspersed with trigonometry as well as exponentials and logarithms to help firmly establish the links that the students need to successfully solve demanding problems. We encourage the path into higher education by providing support with university mathematics entrance examinations and also trips to conferences and lectures at University of Warwick and University of Birmingham.

For specific information relating to the content of the curriculum in each year group, opportunities for wider personal development and enrichment and ways for parents to support their daughter in her learning within this subject, please see the Learning Overviews on our website.