

## Curriculum Overview

### Year 11 – Mathematics 2020-2021



#### Rationale for Year 11 Mathematics (higher)

The KS4 National Curriculum for Mathematics is a cohesive program aimed at developing maths skills to the highest level. It is designed to fill the learners' needs in order to prepare them for the world of work and is 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. Our aim is to develop learners that: 1) Have a love of maths; 2) Acquire maths mastery skills; 3) Are able to problem solve; 4) Can make connections between topics, in order to deepen their understanding of mathematics; 5) Are confident and able to take risks in their learning; 6) Are fluent in the fundamentals of Mathematics; 7) Can apply the skills learnt in their wider life experience; 8) Can reason mathematically.

#### What will students learn and why?

Students will follow the syllabus from the exam board Edexcel, as well as being a well-established course and recognised internationally. It is the most popular Mathematics GCSE course delivered in England and the clear articulation of questions is considered to meet the needs of our learners well. There are significantly increased demands of the current GCSE, in terms of its content and the associated skills and mathematical reasoning required, at both Higher and Foundation tier. The assessments will cover the following content headings: **1 Number 2 Algebra 3 Ratio, proportion and rates of change 4 Geometry and measures 5 Probability 6 Statistics**. Topics such as trigonometry, vectors and standard form are present at Higher tier GCSE. The Higher course tackles some of the more complex skills in year 11, particularly in the area of algebra. At both tiers, topics are sequenced carefully, building on prior knowledge from year ten. Extending and formalising students' knowledge is achieved in a range of ways, with students supported through knowledge organisers.

#### How will students learn?

Students will learn through a range of techniques. A significant proportion of each lesson will focus on building on prior knowledge, with new concepts presented in small steps and scaffolded as required. The teacher will go through examples systematically, gradually taking away the scaffolding with each example, to model these new ideas. Students will learn to become independent learners as teachers engineer success by making each step achievable with ambitious end goals. Dual coding, the process of combining verbal materials with visual materials, is a key part of successful learning in maths, particularly within topics of statistics and geometry and measure. Exam questions that contain diagrams typically also contain a large amount of text. Students will be taught how to tackle these questions by gradually introducing text onto diagrams after learning the basic concepts. This will be delivered in conjunction with exam technique development, for example annotating a triangle as a way of accessing method marks. Flip charts are selective with information and not have any unnecessary distractions on them, in order that students can focus on the things required. Teachers will use skilful questioning techniques to assess understanding throughout the lesson, identifying any misconceptions and ensuring that any required prior knowledge is secure before moving on (see below). Students will then get time to practice these new ideas independently, with extra support for those that need it. The regular use of retrieval practice (revisiting topics) will also help inform teaching (see below for more detail). The use of knowledge organisers as a tool for the recall of facts, for example students asked to memorise certain facts that will be tested on the next lesson e.g. to learn the first twenty square numbers; to learn

basic circle formulae. At the end of lessons, there will be an exam question on the topic, as it is important that students get experience of exam style questions prior to any exams and gain knowledge of how much time different types of question take. The mathematics scheme of work is sequenced to provide spacing between topics with the most complex concepts studied in year 11. Topics are interleaved where possible, with students being shown the links between various topics, for example fractions and ratio with probability, or sequences with substitution.

How will students be assessed?

Students will be assessed in a range of ways, using both formative and summative assessment. Embedded into the Mathematic Year 11 scheme of work is the regular use of retrieval practice. This will happen approximately once per week and will vary in form; including quizzes, paired quizzes, silent quizzes or the use of knowledge organisers. Retrieval practices are 'closed book', as it is important that teachers find out what students don't know in order to inform their teaching. These low stakes tests will only take up 10 minutes of the lesson and the answers will be displayed with the teacher going through specific questions that have caused difficulty or misconceptions identified. Throughout every mathematics lesson, teachers will regularly check for understanding for example through questioning techniques such as no hands up, 'say it again better', no opting out and whole class response (use of mini whiteboards).

After every topic, students will sit an open book test, the purpose of which is to give students experience of tackling exam style questions independently as well as to build up confidence. We also aim for these tests to train students to use their exercise books effectively, both in terms of motivating students to make high quality written notes in the lesson as well as create a useful resource for revision. The test will not last the whole lesson and the teacher will go through the test using the visualiser while students mark their answers. The test will be collected by the teacher to identify any common misconceptions that need to be addressed before progressing to the next topic. There will also be several independent closed book assessments spread across the year, including one formal full mock exam. This will comprise a full set of three exam papers, the purpose being not only to get an accurate assessment of where students are, but also to inform interventions. Students will sit the mock in formal exam conditions.

What is the aim for learners by the end of the year in comparison to the previous year?

Students will build on learning from year 10 further developing fluency, mathematical reasoning and competence in solving increasingly sophisticated problems across the NC areas of number, algebra, ratio, proportion and rates of change, geometry and measures, probability and statistics. The amount of time dedicated to studying each area reflects the weightings on the tier of entry. Across both tiers, there will be even greater emphasis on exam questions and on developing exam technique in year 11. For example, how to break larger mark questions down into manageable parts, learning how long to spend on questions and how to maximise their marks on any given question. The aims of this are to further develop student confidence in the exam questions as students' progress through year 11.

By the end of year 11 Higher students will have learnt the following new content: simplify surds, including rationalising the denominator of a surd expression; manipulate quadratic expressions by completing the square; deduce roots and turning points of quadratic functions; understand the concept of an instantaneous rate of change; sketch translations and reflections of given functions; solve quadratic inequalities in one variable; use the sine and cosine rules to solve problems. Students are expected to know graphs of exponential and trigonometric functions, know sine rule,  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$  as well as cosine rule,  $a^2 = b^2 + c^2 - 2bc \cos A$ . They will also know how to find the area of a triangle (by trigonometry) using the formula  $A = \frac{1}{2}ab \sin C$ . They will know that histograms should be plotted using frequency density when groups are of unequal widths.

