A Level Mathematics
Curriculum Overview 2020-2021

Core aims of the subject

"Mathematics expresses values that reflect the cosmos, including orderliness, balance, harmony, logic, and abstract beauty." **Deepak Chopra**

Mathematics is a creative and highly inter-connected discipline 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.

Our curriculum in mathematics aims to develop fluency in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that students develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. We are also striving to allow students to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, develop mathematical arguments and proofs and make conclusions based on logical inferences. Our intention is also for students to solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions; as such resilience is a crucial skill that we will be cultivating in students. Students also need to be able to utilise technology effectively, such as scientific calculators, to perform increasingly complex problems (as well having strong written and mental mathematical skills, not instead of). As the repertoire of mathematical skills that a student possesses grows increasingly more complex, so should the ability of students to use their mathematics to model real life situations.

At key stage 3, we promote equality by working through the breadth of the curriculum at the same pace for all students so that all students can achieve regardless of their starting point. All students at key stage 3 have the option of attending a number of lunchtime clubs in mathematics (Countdown club, 24 club, TT Rockstars club). We extend our highest attaining students through depth and more challenging problem solving, rather than an acceleration of content. At key stage 4, all students continue their mathematical studies on an appropriate GCSE pathway determined by their prior attainment and performance across key stages 2 and 3 to give them the best chance of achieving well in the subject. The GCSE curriculum is also supplemented for the most able students by offering Additional Maths to inspire, motivate and support students in their transition to key stage 5; in all key stages we also enter our most able students into the annual UKMT maths challenge competition. We intend for a high proportion of our students to go on and study or use mathematics in some form post-16; this

means that our key stage 4 curriculum needs to be broad enough to cater for students who will go on to study maths at the highest level in our Further Mathematics and STEP preparation classes to those who will study Core Mathematics to complement their A Level choices.

In addition to the obvious intention of preparing students for more advanced mathematical studies, mathematics also prepares students for future learning in other disciplines and improves the cognitive ability in general of students and, as such, is essential for their personal development. The study of mathematics conditions the brain to see connections and builds neural pathways that make the brain stronger for all other things. Mathematical study enhances students' general intelligence and supports the life-long learning of students by: creating a framework in the brain for systematic thinking, developing the ability to solve and analyse problems, stretching the mind to work on unfamiliar tasks with confidence, developing the sequencing skills critical to arriving at accurate results or logical conclusions, promoting caution and care in thinking and deciphering complex mathematical problems to arrive at an accurate answer and learning through trial and error to integrate different principles to arrive at a logical conclusion.

In addition to these disciplinary aspects of the mathematics curriculum, the actual mathematical knowledge and skills that students learn are also vitally important in allowing students to achieve elsewhere in school. Topics studied in mathematics are prerequisite for several disciplines across key stages 3, 4 and 5 such as geography, psychology and economics (to name only a few). Mathematics also provides a theoretical springboard for the ever-evolving STEM sector. Nationally, there are huge shortfalls in job applicants with strong STEM skills and reports estimate that the cost of this shortfall is £1.5 billion each year. Furthermore, occupations in the STEM sector are growing at a rate that nearly is nearly double other sectors which could see this shortfall exacerbated. Our intention is to develop students' abilities sufficiently so that they are able to rise to the challenging opportunities this sector has to offer. In the 21st century science, technology and engineering are constantly changing and have become increasingly important for society. The mathematical principles that govern these areas, however, have not changed and consequently the breadth and depth of our curriculum aims to future-proof our students in this field. This is all in addition to the inspirational and motivating research that claims that candidates with strong maths skills earn on average 11% more in their lifetime.

Mathematics is a discipline which is universal; transcending language and cultural differences. Throughout its rich history, mathematics has adopted elements from around the world and gives students the opportunity to appreciate fundamental truths and create water-tight arguments based on logic and reasoning; as such it helps contribute to the student's spiritual, moral, spiritual and cultural development.

Ultimately, the intention of the maths curriculum is to provide students with the necessary thinking skills and content to be successful in their next stage of life or education.

Assessment

Each chapter will be assessed by an end of unit test. More formal assessment happens at the end of year 12 and the end of the Autumn term in year 13 where students will sit a full mock exam. Informal assessment happens in lesson through questioning and circulating the

classroom. A lot of work at Key Stage 5 is self-assessed as students have access to answers and solutions to the vast majority of questions that they answer. Homework is also used to assess students throughout each unit (see below).

Homework

Students receive a weekly DrFrostMaths homework using the platform listed below. The website automatically marks student work and staff and students can leave each other comments to ask questions/ provide feedback as needed.
Each homework focuses on a specific topic with questions increasing in difficulty through the homework.
Students are also expected to finish exercises started in lessons and complete mixed exercises at the end of each unit. These tasks may not be assessed by the teacher but the expectation is that these will be completed in students' study periods.

Clubs and/or intervention

Drop-in sessions run each week
UKMT Mentoring runs each week

Parental/Carer support

Parents can check homework online to keep up to date with student work.
Encourage students to attend drop-in sessions

Connections to Learning

Mathematics is a highly inter-connected discipline. A Level Mathematics has pure mathematics content which can be divided into the following strands: algebra, trigonometry, coordinate geometry and calculus. A Level Mathematics also has statistics and mechanics content which are applications of the pure mathematics content. These strands can be thought of as symbiotic; advances in one strand allow for further development of the others. Consequently, the connections between the various strands of the mathematics curriculum are myriad and one of the most enjoyable aspects of mathematics is studying seemingly separate areas of study and then making links between them and seeing how these areas interact. In mathematics lessons, depth of understanding is prioritised. This involves taking the time to see how a particular topic links to the other topics that have already been studied. As a consequence of the need to understand all of these various connections within mathematics, students should expect to be given regular opportunity to review prior learning as students will struggle with new concepts if they have not developed fluency with previous concepts.

Below shows the progression of the different strands of A Level mathematics. While these topic areas have been presented as separate strands they should definitely not be viewed as mutually exclusive. As mentioned above each topic area in a given strand links to topics in the other strands. In key stage five, there is an increased emphasis on problem solving and mathematical modelling.

Algebra (The following chapters from A Level mathematics build on the ideas and concepts met in the algebra strand of GCSE mathematics):
Chapter 1 Algebraic Expressions
Chapter 2 Quadratics
Chapter 3 Equations and Inequalities
Chapter 7 Algebraic Methods
Chapter 8 The Binomial Expansion
Chapter 14 Exponentials and Logarithms
Chapter 1 Algebraic Methods
Chapter 3 Sequences and Series
Chapter 4 Binomial Expansion

Trigonometry (The following chapters from A Level mathematics build on the ideas and concepts met in the geometry strand of GCSE mathematics):
Chapter 9 Trigonometric Ratios
Chapter 10 Trigonometric Identities and Equations
Chapter 5 Radians
Chapter 6 Trigonometric Functions
Chapter 7 Trigonometry and Modelling

Coordinate Geometry (The following chapters from A Level mathematics build on the ideas and concepts met in the algebra strand of GCSE mathematics):
Chapter 4 Graphs and Transformations
Chapter 5 Straight Line Graphs
Chapter 6 Circles
Chapter 11 Vectors
Chapter 2 Functions and Graphs
Chapter 8 Parametric Equations
Chapter 12 Vectors

Calculus (The following chapters from A Level mathematics build on the ideas and concepts met in the algebra strand of GCSE mathematics as well as the coordinate geometry strand of A Level mathematics):
Chapter 12 Differentiation
Chapter 13 Integration
Chapter 9 Differentiation
Chapter 10 Numerical Methods
Chapter 11 Integration

Statistics (The following chapters from A Level mathematics build on the ideas and concepts met in the statistics strand of GCSE mathematics):
Chapter 1 Data Collection
Chapter 2 Measures of Location and Spread
Chapter 3 Representations of Data
Chapter 4 Correlation
Chapter 5 Probability
Chapter 6 Statistical Distributions
Chapter 7 Hypothesis Testing
Chapter 1 Regression, Correlation and Hypothesis Testing
Chapter 2 Conditional Probability
Chapter 3 The Normal Distribution

Mechanics (The following chapters from A Level mathematics build on the ideas and concepts met in the geometry strand of GCSE mathematics):
Chapter 8 Modelling in Mechanics
Chapter 9 Constant Acceleration
Chapter 10 Forces and Motion
Chapter 11 Variable Acceleration
Chapter 4 Moments
Chapter 5 Forces and Friction
Chapter 6 Projectiles
Chapter 7 Applications of Forces
Chapter 8 Further Kinematics

Connections to Future Pathways

Studying maths helps to develop skills in logical thinking, analysis, problem-solving, decision-making and communication, which are valued by employers across many job sectors. Furthermore, mathematical careers are in every business and industry throughout every sector of

the economy. Mathematics may not be the central focus of all professions, but it can serve as critical building blocks of a larger and more meaningful whole. Mechanical engineers, for example, work with numbers for the design and production of all types of simple and complex machines. Actuaries use numbers to calculate and assess the consequences of financial risk. And economists analyse and interpret quantitative data to discern macro- and micro-economic patterns. Banking is a world of numbers and mathematics is used in the way accounts are handled, for calculating interest rates and for determining credit scores.

Data - Again, big data plays a major role in the increased demand for skilled data scientists. It is the job of data scientists to immerse themselves in the ocean of big data, bringing structure to it that, in turn, allows for effective analysis of that data. Many employers rate the ability to handle data very highly.
Number – Banking, Accountancy and Finance. For example, Accountants examine financial records and prepare financial documents for businesses, nonprofits, firms and individuals. They are responsible for the accuracy of the documents they create and for making sure that taxes are paid on time.
Geometry – Architecture, Civil Engineering and Astronomers. Geometry is used in astronomy in many, many ways. One of the most common uses, however, is the use of geometry to find the distance between celestial objects, such as stars and planets. ... But other uses of geometry include measuring the speed and velocity of planets orbiting other stars.
Algebra – Air Traffic Controllers, Video Game Designers and Economists. Air traffic controller uses math in order to be able to understand distances and measurements at a moment's notice. They also must be able to do mental math quickly and accurately. Part of their job is directing aircraft at what altitude and speed to fly. For example, air traffic controllers frequently need to calculate the minimum safe level for planes to fly at. To do this they use the equation:

Minimum safe level (measured in feet) = 30 × (1013 - pa)
(*pa* is the atmospheric pressure. This value can change daily, depending on weather systems.)

Other Careers:
• Logistics specialist • Control statistician • Systems operation analyst • Robotics analyst • Actuary • Insurance underwriter • Operations research analyst • Technical mathematical modeller • Financial analyst • Business metrics analyst • Big data analyst • Marketing consultant • Claims adjuster • Database administrator • Cryptographer

Helpful sources of information

https://www.drfrostmaths.com/ provides a lot of the Powerpoint slides and resources that are used in lessons, this is also the platform where students complete their homework.
https://www.examsolutions.net/ and https://www.physicsandmathstutor.com/ are very helpful websites to help students prepare for exams
https://www.pearsonactivelearn.com/ has electronic access to the course textbooks (students will need a login from their class teacher to access these)

https://integralmaths.org/ has a lot of support for students and contains assessments (as well as revision notes) for each unit across years 12 and 13
https://hegartymaths.com/ has video tutorials and quizzes on all of the prerequisite skills from key stages 3 and 4
https://www.desmos.com/ is a free graphing tool which students will find helpful to aid coordinate geometry problems; there is also an app for this that they can install on their phone
https://maths.org/step/ provides resources to help students to prepare for STEP

Year 12 Overview

Term	Knowledge	Assessment
Autumn 1	Chapters 1, 2 and 3: Algebraic Expressions, Quadratics Equations & Inequalities These chapters contain predominantly GCSE content but are vital for success in A Level mathematics as these basic skills underpin all subsequent skills in the course (and in Further Mathematics). Chapter 7: Algebraic Methods Here students are taught the formal method for algebraic long division and are then challenged to use this to factorise cubic and quartic expressions to develop their algebra skills even further. Chapter 11: Vectors & Chapter 12: Vectors (Year 2) In this chapter, students build on the concept of vectors from GCSE and extend their skills to include 3-dimensional vectors as well as utilising the method of equating coefficients to solve more advanced problems.	
	➢ Laws of indices for all rational exponents ➢ Use and manipulate surds, including rationalising the denominator. ➢ Work with quadratic functions and their graphs. The discriminant of a quadratic function. Completing the square. Solution of quadratic equations including solving quadratic equations in a function of the unknown. ➢ Solve simultaneous equations in two variables, including one linear and one quadratic equation. ➢ Solve linear inequalities ➢ Vectors in two dimensions and in three dimensions ➢ Understand and use position vectors ➢ Equation of a straight line, including the forms $y - y1 = m(x - x1)$ and $ax + by + c = 0$. ➢ Parallel and perpendicular gradients	➢ A baseline assessment will be carried out in September to highlight any areas from GCSE that need to be addressed. ➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.

	➢ Algebraic division; use of the factor theorem.	
Autumn 2	Chapter 4: Graphs and Transformations Picking up where GCSE maths left off, this chapter extends students' abilities to sketch and recognise curves and apply transformations (such as translations, reflections and stretches) to graphs using function notation. Chapter 5: Straight Line Graphs This chapter contains mostly GCSE content though the ideas and concepts are presented in a more formal manner. There is also a big emphasis in this chapter on utilising straight line graphs to model real-life contexts and to solve problems. Chapter 6: Circles Picking up where GCSE maths left off, this chapter extends students' understanding of the equation of the circle and extends to circles whose centre is not at the origin. There is a high level of problem solving skills required in this chapter as a single problem can need students to utilise skills from all 5 of the previous chapters. Chapter 9: Trigonometric Ratios This chapter contains mostly GCSE content but extends the ideas to include more problem solving and a deeper understanding of trigonometry (such as the ambiguous case of the sine rule). Here students utilise the sine and cosine ratios to solve problems involving unknown sides, angles and areas in triangles. Chapter 12: Differentiation Calculus is introduced to students here as the concept of gradient of a curve before extending this understanding to incorporate rates of change in general. In year 12 students focus on differentiating power series and manipulating equations into this form to allow them to be differentiated as well as applying this to finding tangents, normal and maximisation and minimisation problems.	
	➢ Quadratic inequalities ➢ Regions defined by inequalities ➢ Cubic, Quartic and Reciprocal Graphs ➢ Sketching graphs and graph transformations ➢ Non-right angled trigonometry ➢ Midpoints and equations of perpendicular bisectors ➢ Equation of a circle ➢ Gradient functions and differentiating polynomials ➢ Equations of tangents and normal ➢ Increasing, decreasing functions and stationary points	➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.

<table>
<tr><td>Spring 1</td><td colspan="2">Chapter 10: Trigonometric Equations and Identities
In this chapter, students learn to use the trigonometric ratios outside of the context of triangles and as mathematical objects in their own right. Trigonometric identities are introduced and these are used to solve increasingly challenging trigonometric equations.

Chapter 5: Radians (Year 2)
Radians as an alternative to degrees is an important concept for students to understand. This chapter revisits GCSE skills such as arc length and area of a sector but sees how using radians rather than degrees simplifies the process. This chapter underpins all subsequent work on trigonometry in both A Level Mathematics and Further Mathematics as well as any real-life modelling contexts where trigonometry is required.

Chapter 8: Modelling in Mechanics (Statistics & Mechanics)
This chapter introduces the mechanics component of the course and starts by establishing how real-life phenomena are simplified mathematically (modelling assumptions) to allow them to be manageable using algebraic techniques.

Chapter 9: Constant Acceleration (Statistics & Mechanics)
Building on the concept of speed as a rate of change from GCSE, this chapter extends students' abilities to allow them to calculate using acceleration. Extensive use of the kinematic (suvat) equations is required as well as the use of distance-time and velocity-time graphs to allow students to solve problems.</td></tr>
<tr><td></td><td>➢ Graphs of sine, cosine and tangent
➢ Exact trigonometric values
➢ Solving trigonometric equations using trigonometric identities
➢ Use radians to solve trigonometric equations and to calculate arc length and sector area
➢ Mathematical models
➢ Vectors in mechanics
➢ Displacement-time and velocity-time graphs
➢ Constant acceleration formulae (including vertical motion under gravity)
➢ Exponentials and logarithms</td><td>➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom
➢ A weekly Dr Frost task is also set as homework to assess students.</td></tr>
<tr><td>Spring 2</td><td colspan="2">Chapter 6: Trigonometric Functions (Year 2)
Here the understanding of trigonometric functions extends beyond sin, cos and tan to include sec, cosec, cot, arcsin, arccos and arctan. Students will learn their definitions, relevant identities and their graphs.

Chapter 13: Integration</td></tr>
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	Integration is introduced in this chapter as the inverse operation to differentiation. Later in the chapter it is used as an operation in its own right and students will use it to calculate areas under curves. Chapter 14: Exponentials and Logarithms In this chapter, students extend their algebraic manipulation skills to incorporate exponentials and logarithms. Their graphs (and transformations of them) are studied and equations solved by applying an exponential or logarithm to both sides. The laws of logs are also covered as a counter-part to the laws of indices which students have met before. Chapter 10: Forces and Motion (Statistics & Mechanics) Students build on their understanding of motion from the constant acceleration chapter to include forces. Newton's second law is an important concept in this chapter and students will use it to solve problems in a variety of contexts such as lifts and pulleys.	
	➢ Small angle approximations ➢ Secant, Cosecant and Cot ➢ Graphs of reciprocal trig functions ➢ Arcsin, arccos and arctan ➢ Integrating polynomials ➢ Definite integrals ➢ Natural logarithms ➢ Linearising data ➢ Newton's law of motion ➢ Connected particles ➢ Variable acceleration	➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students. ➢ And end of year 12 will be sat which will comprise two papers: one pure paper and one mechanics and statistics paper. These papers will be based on past A Level Mathematics papers.
Summer 1	Chapter 11: Variable Acceleration (Statistics & Mechanics) Combining the skills from differentiation and integration with the work covered on acceleration, this chapter is an opportunity for students to see where their calculus skills can be applied to mechanics. Chapter 8: Binomial Expansion	

	Students' algebra skills are developed here to allow them to expand brackets comprising two terms (binomials) to a given positive, integer power. Students also meet the concept of factorials here for the first time and learn how this links to combinatorics. Chapter 2: Measures of Location and Spread (Statistics & Mechanics) This chapter contains mostly GCSE content but students are exposed to new ideas such as standard deviation as a measure of spread. Students should also expect the problem solving demands to be higher than when they studied these skills at GCSE.	
	➢ Binomial expansion ➢ Proof ➢ Measures of central tendency ➢ Measures of spread ➢ Areas under curves ➢ Areas between curves ➢ Maxima and minima ➢ Variable acceleration and the constant acceleration formulae	➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.
Summer 2	Chapter 3: Representations of Data (Statistics & Mechanics) This chapter contains mostly GCSE content but the content is covered in more depth, especially with topics such as histograms and box plots. Here students also learn how coding affects a data set. Chapter 4: Correlation Picking up where GCSE left off, this chapter develops students understanding of correlation to allow them to be more rigorous than strong/ weak/ moderate and give a numerical value (the PMCC) to the strength of the correlation. The line of best fit from GCSE is also formalised here as a regression line which can be calculated rather than drawn on by eye. Chapter 5: Probability As with the previous chapter, here students are formalising their understanding of something they have covered at GCSE. Here probability extends to include formal definitions of independent and mutually exclusive events as well as increasing the level of difficulty with familiar methods such as Venn diagrams and tree diagrams. Chapter 6: Statistical Distributions This chapter recaps discrete probability distributions from GCSE progressing onto the binomial distribution which takes concepts covered in the binomial expansion chapter but applies them to probability problems.	

	Chapter 1: Algebraic Methods (Year 2) Picking up where GCSE left off, this chapter revisits manipulation of algebraic fractions before progressing to partial fractions. Partial fractions will be picked back up in year 13 when students use it to find series expansions and integrate functions.	
	➢ Coding in statistics ➢ Outliers, box plots and cumulative frequency ➢ Histograms of unequal width ➢ Probability distributions ➢ Binomial distribution ➢ Cumulative binomial probabilities ➢ Linear regression ➢ Venn diagrams ➢ Mutually exclusive and independent events ➢ Tree diagrams ➢ Algebraic fractions ➢ Partial fractions	➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.

Year 13 Overview

Term	Knowledge	Assessment
Autumn 1	Chapter 2: Functions and Graphs This chapter introduces students to the formal definition of a function as well as revisiting concepts from GCSE such as inverse and composite functions with a new lens as students now have a more sophisticated repertoire of functions. Domain, range and the modulus function are also new ideas in this chapter. Chapter 7: Trigonometry & Modelling Building on the trigonometry covered in year 12, here students extend their trigonometric skills to solve more advanced trigonometric equations, prove more challenging trigonometric identities using the double and addition formulae. Chapter 9: Differentiation In this chapter, students learn to differentiate many more functions compared to year 12 where only power series were covered. By the end of this section students will be able to differentiate most functions they have met so far, including those defined parametrically.	

	Chapter 10: Numerical Methods At GCSE, students learnt iteration as their only numerical method and here this is deepened to include staircase and cobweb diagrams as well as using Newton-Raphson as a new technique completely.	
	➢ Modulus function ➢ Composite and inverse functions ➢ Modulus as a graph transformation ➢ Addition formulae ➢ Simplifying acosx ±bsinx ➢ Solving trigonometric equations ➢ Proving trigonometric identities ➢ Trigonometric modelling ➢ Differentiating trigonometric functions ➢ Differentiating exponentials and logarithms ➢ Chain, product and quotient rules ➢ Implicit differentiation ➢ Second derivatives ➢ Locating roots ➢ Iteration ➢ Newton-Raphson method ➢	➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.
Autumn 2	Chapter 11: Integration Potentially the most challenging chapter of the A Level course, this chapter introduces students to a variety of sophisticated integration techniques to extend their year 12 skills. In this chapter, students also apply their calculus skills to differential equations which is a vitally important mathematical topic for further mathematical study. Chapter 7: Applications of Forces (Statistics & Mechanics) This chapter allows students to consolidate the work covered in year 12 on forces as well as extending to include friction, forces on slopes and forces that are not horizontal or vertical. Chapter 3: Sequences & Series Picking up where GCSE left off, this chapter formalises work covered on arithmetic and geometric sequences before progressing onto arithmetic and geometric series.	
	➢ Integrating f(ax+b) ➢ Integrating trigonometric functions	➢ Each chapter will be assessed by an end of unit test. Informal

	➢ Reverse chain rule ➢ Integration by substitution ➢ Integration by parts ➢ Integration using partial fractions ➢ Finding areas ➢ The trapezium rule ➢ Rates of change ➢ Solving differential equations ➢ Modelling with derivatives ➢ Resolving forces ➢ Forces on inclined planes ➢ Friction ➢ Static particles ➢ Modelling with statics ➢ Friction and statics ➢ Dynamic particles on inclined planes ➢ Connected particles ➢ Arithmetic sequences and series ➢ Geometric sequences and series ➢ Sum to infinity ➢ Sigma notation ➢ Recurrence relations ➢ Modelling with series	assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.
Spring 1	Chapter 2: Conditional Probability (Statistics & Mechanics) Continuing the formal work on probability in year 12, this chapter introduces students to conditional probability making use of set notation in the context of tree and Venn diagrams. Chapter 1: Regression, Correlation and Hypothesis Testing (Statistics & Mechanics) Continuing the work on correlation in year 12, this chapter extends to non-linear regression (such as an exponential model) and also teaches students to perform a hypothesis test to see whether there is a correlation or not. Chapter 4: Binomial Expansion Here students extend their knowledge of binomial expansion from year 12 to allow them to expand a bracket with a negative or fractional power. Students revisit the skill of partial fractions in this unit also.	

	Chapter 8: Parametric Equations A synoptic chapter bringing together most of the skills covered in the A Level so far. Here students learn how functions can be defined parametrically and this new concept is then linked with all of the previous coordinate geometry and calculus skills covered so far. Chapter 6: Projectiles (Statistics & Mechanics) This chapter extends the work on kinematics in year 12 to projectile motion (rather than horizontal or vertical motion). Students should expect a high level of problem solving in this chapter.	
	➢ Set notation and conditional probability ➢ Venn diagrams and conditional probability ➢ Probability formulae ➢ Tree diagrams ➢ Exponential modelling ➢ Measuring correlation ➢ Hypothesis testing for zero correlation ➢ Expanding $(1+x)^n$ ➢ Expanding $(a+bx)^n$ ➢ Parametric equations ➢ Sketching parametric curves ➢ Intersections of parametric equations ➢ Parametric differentiation ➢ Parametric integration ➢ Horizontal projectiles ➢ Projectiles at an angle ➢ Projectile motion formulae ➢	➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.
Spring 2	Chapter 3: Normal Distribution (Statistics & Mechanics) This chapter teaches students about the normal distribution (a continuous distribution) as a contrast to the binomial (discrete) distribution met in year 12. Students also will perform hypothesis tests based on normal distributions and use the standardised and inverse normal distributions. Chapter 4: Moments (Statistics & Mechanics)	

	Students should have met the idea of moments in GCSE science. Here they will use it to solve problems, culminating in some challenging work on static rigid bodies which also combines skills from Chapter 7. Chapter 5: Further Kinematics (Statistics & Mechanics) In year 13, students have increased their calculus skills tremendously and in this chapter they are required to use them to solve problems involving variable acceleration.	
	➢ Binomial distribution ➢ Normal distribution ➢ Inverse normal distribution ➢ Standard normal distribution ➢ Approximating a binomial distribution with normal distribution ➢ Hypothesis testing with normal distribution ➢ Finding critical values ➢ One tailed test ➢ Two tailed tests ➢ Moments ➢ Resultant moments ➢ Equilibrium ➢ Centres of mass ➢ Tilting ➢ Static rigid bodies ➢ Vectors in kinematics ➢ Vector methods with projectiles ➢ Variable acceleration with one dimension ➢ Differentiating or integrating vectors ➢ Proof by contradiction	➢ Each chapter will be assessed by an end of unit test. Informal assessment happens in lesson through questioning and circulating the classroom ➢ A weekly Dr Frost task is also set as homework to assess students.