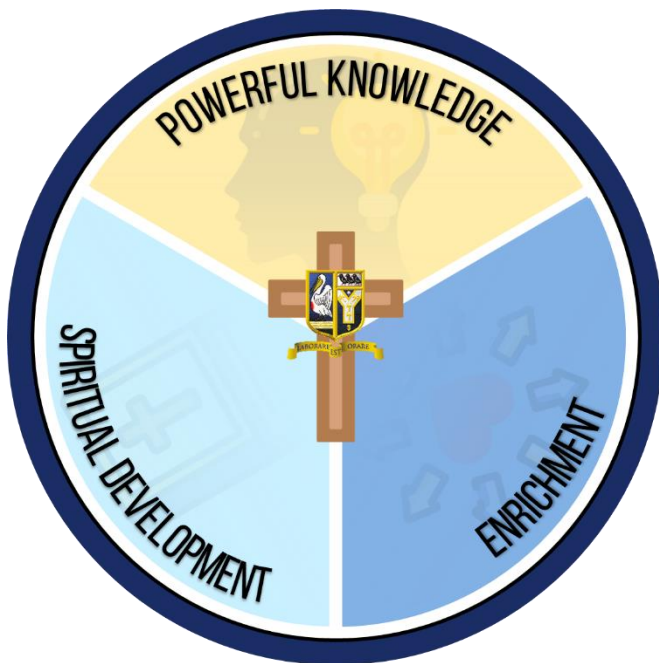


THE BECKET SCHOOL



MATHEMATICS

CURRICULUM INTENT



*"I HAVE COME IN ORDER THAT YOU MIGHT HAVE
LIFE
—LIFE IN ALL ITS FULLNESS."*

~JOHN 10:10

"MATHEMATICS IS NOT ONLY REAL BUT IT IS THE ONLY REALITY" MARTIN GARDNER

MATHEMATICS IS A FUNDAMENTAL PART OF HUMAN THOUGHT AND LOGIC, AND INTEGRAL TO ATTEMPTS AT UNDERSTANDING THE WORLD AND OURSELVES. MATHEMATICS PROVIDES AN EFFECTIVE WAY OF BUILDING MENTAL DISCIPLINE AND ENCOURAGES LOGICAL REASONING AND MENTAL RIGOR. IN ADDITION, MATHEMATICAL KNOWLEDGE PLAYS A CRUCIAL ROLE IN UNDERSTANDING THE CONTENTS OF OTHER SCHOOL SUBJECTS SUCH AS SCIENCE, SOCIAL STUDIES, AND EVEN MUSIC AND ART. – INTERNATIONAL COMMISSION ON MATHEMATICAL INSTRUCTION

INTENDED OUTCOMES

What will I gain from studying mathematics?

Anyone can achieve in Mathematics.

At The Becket School it is our aim to help you become lifelong learners of Mathematics. We want you to leave school with fantastic qualifications as well as having a love for this subject and wanting to use it or know more about it beyond school. As Maths teachers we are passionate about sharing our knowledge with you but also helping you develop the skills to make you happy and success in life such as: being analytical; problem solving; being inquisitive; critical thinking; constructing logical arguments; being accurate and precise and many more...!

These are the general learning outcomes for each year:

- **In Year 7 and Year 8** you will develop your understanding of equivalence, particularly in number, proportion and algebraic contexts. For the first time, you will learn specific algebraic techniques and how to interpret ratios.
- **In Year 9**, you will learn how to solve different linear equations and inequalities. You will apply your algebraic knowledge in straight line graph theory.
- **In Year 10**, you will expand your knowledge of geometry, whereby you will study Pythagoras Theorem and Trigonometry in 2D and 3D contexts. You will also study rates of change and compound measures, looking at financial models, speed, velocity and density.
- **In Year 11**, you will learn more advanced algebraic techniques such as various ways of solving quadratic equations. You will expand your geometry further through the study of Circle Theorems and vectors. You will learn how to construct algebraic and geometric proof – skills crucial for A level study!
- **In Year 12** you can either study A Level Maths or AS Core Maths. AS Core Maths will help you learn about the applications of maths in financial and everyday statistical contexts. A Level Maths will develop your algebraic reasoning in all areas of Mathematics. You will study calculus for the first time as well as enumeration techniques such as the Binomial Expansion. These topics form the basis of your study in the applied side of the course in Statistics and Mechanics.
- **In Year 13**, A Level Maths you will build on your year 12 study. In Year 13 there is a greater emphasis on using your learning in modelling contexts, particular in trigonometry and calculus. You learn more about different statistical tests and more about the role of forces and projectiles in Mechanics.

CURRICULUM INTENT

POWERFUL KNOWLEDGE	<p style="text-align: center;"><i>What will I learn by studying mathematics?</i></p> <p>Students will:</p> <ul style="list-style-type: none"> • Learn knowledge and skills around the five main topic areas - <i>Number, Algebra, Geometry, Probability and Statistics</i> and <i>Ratio, Proportion and Rates of Change</i>. • Build up confidence and fluency in these five topic areas throughout all Key Stages • Show increasing application and independence in these core topic areas to deepen and growth their understanding.
SPIRITUAL DEVELOPMENT	<p style="text-align: center;"><i>How will being a mathematician help me grow as a person?</i></p> <ul style="list-style-type: none"> • Studying Mathematics provides meaning to <i>everyday life</i>. • Learn the theory behind the core concepts and how to apply them to familiar contexts. • The opportunity to study <i>Personal Finance</i> in Years 9 and 10 through learning about budgeting and making responsible financial choices. • In Year 10 you will get the exciting opportunity to meet our STEM Ambassadors; people from industry who will show you how they apply mathematics to their jobs in the working world. This is more enrichment • Studying mathematics helps you solve problems. This skill is crucial to making responsible life choices as well as being a productive and active member of society • <i>Mathematics is a pure science of beauty and curiosity</i>. We help you appreciate this through teaching you how to theorise and make generalisations using algebra as well as helping you appreciate how different areas of mathematics connect with each other
ENRICHMENT	<p style="text-align: center;"><i>What can I do as a mathematician?</i></p> <ul style="list-style-type: none"> • In Year 7, have the opportunity to go on the Big Bang Fair in Birmingham, where they can see how maths is used by scientists and employers. • In Year 8, they have the opportunity to go to Bletchley Park to learn about the Mathematics and History behind the famous Enigma Code that helped Britain defeat Nazi spies in World War 2. • In Year 9 and 10, they will take part in Personal Finance lessons, where they will learn about ethical and responsible financial decisions and how to budget. • During STEM week, Years 7-10 will take part in Mathematical projects that extend to other subjects they study! • We promote careers aspirations all the way through our curriculum through the trips we run, STEM week and the guest speakers we invite into school. • KS5 students will extend their knowledge beyond the curriculum via studying topics which are part of The Becket Super Curriculum

CURRICULUM IN THE CLASSROOM

B	BEHAVIOUR IS EXCELLENT	
E	EXPERT TEACHERS	
C	COGNITIVELY ACTIVE	
K	KNOWLEDGE-RICH	
E	EMBEDDED PRACTICE	
T	TESTING-FOR-LEARNING	

HOW WILL I LEARN MATHEMATICS?

- You will be taught by a specialist expert maths teacher who is passionate about sharing their knowledge with you
- A typical Maths lesson starts with a task to help you recall important knowledge that connects to what you are learning next.
- When your teacher teaches you something new, they will stimulate your thinking through working through a knowledge book with you on their visualizer
- We will check what you have learned through giving you regular quizzes and homework and give you feedback on how to improve.
- Once or twice a term we give you a longer assessment to do in order to measure what you have learned over a longer period of time

LEARNING SEQUENCE

YEAR 7

	ADVENT	LENT	PENTECOST
TOPIC	<ul style="list-style-type: none"> Algebraic Thinking Place value and Proportion 	<ul style="list-style-type: none"> Applications of Number Directed Number Fractional Thinking 	<ul style="list-style-type: none"> Lines and Angles Reasoning with Number
EXPLANATION	<p>In the Advent term you will learn about equivalence in algebra and place value and proportion.</p> <p>In the first half term, you will learn how to write and reason algebraically, as well as solving equations.</p> <p>In the second half term, you will learn how to order integers and decimals as well as mastering the skill of fraction, decimal and percentage equivalence</p>	<p>In the Lent term you will learn more about the four main operations in Mathematics: addition, subtraction, multiplication and division.</p> <p>In the first half term, you will learn how to solve worded problems.</p> <p>In the second half term, you will learn about directed number as well as adding and subtracting fractions in both number and worded problems</p>	<p>In the Pentecost term, you will develop your ability to reason in both shape and number contexts</p> <p>In the first half term you will learn how to solve geometry problems and construct and measure</p> <p>In the second half term you will apply your number skills in new learning about probability, prime factorisation and proof</p>

YEAR 8

	ADVENT	LENT	PENTECOST
TOPIC	<ul style="list-style-type: none"> • Proportional Reasoning • Representations 	<ul style="list-style-type: none"> • Algebraic Techniques • Developing Number 	<ul style="list-style-type: none"> • Developing Geometry • Reasoning with Data
EXPLANATION	<p>In the Advent term you will be studying the themes of scale and handling data</p> <p>In the first half term you will be learning how to write, use and interpret ratios and scales</p> <p>In the second half term you will be studying coordinates and data as well as extending your knowledge of probability from year 7</p>	<p>In the Lent term you will be building on your knowledge of algebra and fractions and percentages from year 7</p> <p>In the first half term you will learn algebraic manipulation techniques like expanding brackets, solving inequalities and index laws</p> <p>In the second half term you will build on your knowledge of index laws through learning about numbers expressed in standard index form</p>	<p>In the Pentecost term you will be extending your reasoning skills in the areas of geometry and data</p> <p>In the first half term you will be studying angles in parallel lines and polygons</p> <p>In the second half term you will be extending your knowledge of handling data, which you previously studied in the Advent term</p>

YEAR 7 AND YEAR 8 NUMERACY

We offer a Direct Instruction programme for Year 7 and Year 8 students who need additional support with mastering their mental arithmetic and numerical fluency. The programme is designed to help students recall number facts quicker, e.g. their times tables and apply them more readily to other mathematical contexts. In Year 7, students improve their mental addition and subtraction. In Year 8 students improve their mental multiplication and division.

YEARS 9-11 HIGHER TIER

YEAR 9 HIGHER

TOPIC	Number	Algebraic Expressions	Interpreting and Representing Data	Fractions, Ratios and Percentages	Equations and Inequalities	Linear Geometry and Interpreting Gradients
EXPLANATION	<p>You will learn the skills and knowledge that will help you become successful in years 10, 11 and beyond!</p> <p>You begin by extending aspects of number theory learnt in Y8, E.G. learning more about laws of indices through exploring negative indices. You will learn about rational and irrational numbers and how to manipulate surds!</p> <p>You will apply your learning about indices in Number in the <i>Algebraic Expressions unit</i> through simplifying lots of different expressions. You will also learn how to factorise quadratic expressions for the first time – a skill crucial at GCSE and A level!</p> <p>During the second term you will learn about specific statistical techniques for analysing real life data – e.g. seasonal and annual trends from time series graphs. Following on from this you will extend on your knowledge of equivalence and proportion from Years 7 and 8 through studying ratio problems, fractional/percentage change and reverse percentages.</p> <p>In the last term of Year 9 you will return to algebra by apply your knowledge from Algebraic Expressions in order to solve <i>Equations and Inequalities</i>. You finish the year by studying straight line graph theory ($y=mx +c$) and how we gradients of lines can be used to represent rates of change between two variables</p>					

YEAR 10 HIGHER

TOPIC	Angles and Trigonometry	Area and Volume	Transformations and Constructions	Probability	Multiplicative Reasoning	Similarity and Congruence	Further Trigonometry	Further Statistics
EXPLANATION	<p>You will mostly be extending your knowledge of Geometry and Algebra,</p> <p>At the beginning of Y10 you will extend your knowledge of angles through the study of Pythagoras' Theorem trigonometry for the first time! You will Apply this knowledge in both 2D & 3D contexts in: <i>Area and Volume</i>.</p> <p>Continuing within the field of geometry you will study <i>Transformations and Constructions</i> where you will learn how about the four key transformations as well as how to solve real life loci problems on maps and diagrams with your compass and protractor!</p> <p>You will then learn about <i>Probability</i> theory, including studying the difference between independent and conditional events and why these are important.</p> <p>In <i>Multiplicative Reasoning</i> you extend your knowledge of percentages and rates of change through the study and use of multipliers. You will also study how to apply this in contexts such as finance and population growth.</p> <p>You will then return to geometry topics through applying what you learned about enlargement in <i>Transformations</i> in the unit <i>Similarity and Congruence</i>. In this unit you will learn how to construct formal geometric proofs – a higher order skill used by the best of mathematicians! You will then move onto <i>Further Trigonometry</i>, where you apply your knowledge about Pythagoras' Theorem and trigonometry to 3D contexts. You will also study the sine and cosine rules for the first time.</p> <p>You finish Year 10 studying <i>Further Statistics</i>, which explores the representation of data in box plots, cumulative frequency graphs and histograms. You will learn the advantages and disadvantages of data sampling techniques and how to avoid and spot bias in a dataset – a key skill for doing any research project!</p>							

YEAR 11 HIGHER

TOPIC	Quadratic and Linear Equations, Inequalities and Graphs	Circle Theorems	Further Algebra	Vectors and Geometric Proof	Proportion and Graphs
EXPLANATION	<p>In year 11 you will finalise your GCSE study through learning advanced algebra skills that are required for both achieving the top GCSE grades and also for A level study.</p> <p>You will begin Year 11 in applying your knowledge about quadratics in learning all the different techniques in solving quadratic equations. You will also learn about graphical representations of inequalities too.</p> <p>Following on, you will extend your geometry knowledge in learning about <i>Circle Theorems</i> where you will apply your knowledge of angles, circles and right-angled triangles.</p> <p>In <i>Further Algebra</i>, you will finish your study of pure algebraic concepts through learning about manipulating algebraic fractions and writing formal algebraic proof</p> <p>The theme of proof is continued in the next unit, <i>Vectors and Geometric Proof</i>, where you will learn about the language and application of vectors and how vectors such as velocity are different from scalars such as speed.</p> <p>You finish your GCSE study with a unit on <i>Proportion and Graphs</i>, that extends your knowledge from Year 10 on topics such as direct and indirect proportion as well as speed-time and distance-time graphs. You will study graphs in great detail in terms of how they can represent rates of change. You will finish the unit by studying the transformations of graph, including function notation – which is continued at A level study.</p>				

YEAR 11 LEVEL 3 ADDITIONAL MATHS (SET 1 ONLY)

Year 11 set 1 will do an additional exam in Year 11 called Level 3 Additional Maths. This is a qualification that is worth part of an A level. It will help you understand the more challenging areas of GCSE Maths as well as preparing you for A level study. You will study this content once the GCSE content is finished.

TOPIC	Algebra	Enumeration	Coordinate Geometry	Pythagoras and Trigonometry	Calculus	Numerical Methods	Exponentials and Logarithms
EXPLANATION	<p>In <i>Algebra</i> you will extend your knowledge of algebraic fractions whilst studying factor theorem and recurrence relationships for the first time.</p> <p>In <i>Enumeration</i> you learn about number distributions E.G. binomial expansion, which you apply to probability.</p> <p>Two geometry units follow. In Coordinate geometry you use Pythagoras' Theorem to work out the distance between two points. In Pythagoras and Trigonometry, you learn about some important trig identities and how to solve trigonometric equations.</p> <p>In Calculus you visit differentiation and integration – key concepts used throughout A level study.</p> <p>You will apply Numerical Methods to geometry problems – E.G. finding the area under a curve or the gradient of a curve.</p> <p>Lastly you will learn about Exponential and Logarithmic functions, which extends your knowledge from the Proportion and Graphs until in GCSE Year 11.</p>						

YEARS 9-11 FOUNDATION TIER

YEAR 9 FOUNDATION

TOPIC	Number	Algebraic Expressions	Graphs, Tables and Charts	Fractions, Decimals and Percentages	Equations, Inequalities and Sequences	Graphs
EXPLANATION	<p>GCSE Foundation tier focuses more on mastering the key mathematical concepts you are more likely to use in everyday concepts. In Year 9, Foundation tier closely follows what is studied in Higher tier. However, more focus is given to mastering the fundamentals of Maths.</p> <p>In <i>Number</i>, you will strengthen your arithmetic skills as well as learning more about prime factorisation that you started in Y8.</p> <p>In <i>Algebraic Expressions</i>, you will learn how to simplify different algebraic expressions and apply laws of indices.</p> <p>In <i>Graphs, Tables and Charts</i>, term you will learn about specific statistical techniques for analysing real life data – e.g. seasonal and annual trends from time series graphs. Following on from this you will extend on your knowledge of equivalence and proportion from Years 7 and 8 through your study of <i>Fraction, Decimals and Percentages</i>.</p> <p>In the last term of Year 9 you will return to algebra by apply your knowledge from Algebraic Expressions in order to solve <i>Equations, Inequalities and Sequences</i>. You finish the year by studying straight line graph theory ($y=mx +c$) and how we gradients of lines can be used to represent rates of change between two variables.</p>					

YEAR 10 FOUNDATION

TOPIC	Angles	Perimeter, Area and Volume 1	Transformations	Averages and Range	Ratio and Proportion	Right Angled Triangles	Probability	Multiplicative Reasoning
EXPLANATION	<p>In Year 10 you will begin learning in 3 geometry units. Firstly, in <i>Angles</i> you will learn how to solve complex angle problems using parallel lines and interior and exterior angles in polygons. <i>Next in Perimeter, Area and Volume</i> you will solve problems in 2D and 3D shapes contexts. Thirdly, you will study the four <i>Transformations</i> in the x-y plane.</p> <p>After studying geometry, you will learn about summary statistics such as median, mode, median and range. You will then extend your knowledge of <i>Ratio and Proportion</i> before studying Pythagoras' Theorem and Trigonometry.</p> <p>In the last term you will learn about <i>Probability</i> theory, including studying the difference between independent and conditional events and why these are important.</p> <p>In <i>Multiplicative Reasoning</i> you extend your knowledge of percentages and rates of change through the study and use of multipliers. You will also study how to apply this in contexts such as finance and population growth.</p>							

YEAR 11 FOUNDATION

TOPIC	Loci and Constructions	Quadratic Equations and Graphs	Perimeter, Area and Volume 2	Fractions, Indices and Standard Form	Similarity and Enlargement	Further Algebra
EXPLANATION	<p>In year 11 you will finalise your GCSE study through learning more advanced algebra, number and geometry skills that are required for achieving a grade 5 at GCSE Foundation.</p> <p>Year 11 begins with <i>Loci and Constructions</i>, where you will learn how to solve real life loci problems on maps and diagrams with your compass and protractor!</p> <p>You will then learn about the different representations of quadratics in the study of <i>Quadratic Equations and Graphs</i>.</p> <p>Next, you will extend your Year 10 study of <i>Perimeter, Area and Volume</i>, including the study of geometric problems that involve 3d non-prisms including pyramids, cones and spheres.</p> <p>You will then return to the study of fraction arithmetic, laws of indices and then applying this in calculating with Standard form.</p> <p>You will then return to geometry topics through applying what you learned about enlargement in <i>Transformations</i> in the unit <i>Similarity and Enlargement</i>. In this unit you will learn how to construct formal geometric proofs – a higher order skill used by the best of mathematicians!</p> <p>In <i>Further Algebra</i>, you will finish your study of pure algebraic concepts through learning how to solve simultaneous equations.</p>					

YEARS 12-13

YEAR 12

	ADVENT	LENT	PENTECOST
TOPIC	<p>Pure 1</p> <ul style="list-style-type: none"> - Algebraic expressions - Quadratics - Equations and Inequalities - Graphs and Transformations - Straight line graphs - Circles - Algebraic methods - The binomial expansion - Trigonometric ratios - Vectors - Differentiation 	<p>Pure 1</p> <ul style="list-style-type: none"> - Trigonometric identities and equations - Integration <p>Statistics 1</p> <ul style="list-style-type: none"> - Large Data Set - Measures of Location and Spread - Representations of Data - Correlation - Probability - Statistical Distributions <p>Mechanics 1</p> <ul style="list-style-type: none"> - Modelling in Mechanics - Constant Acceleration - Forces and Motion 	<p>Statistics 1</p> <ul style="list-style-type: none"> - Hypothesis Testing <p>Mechanics 1</p> <ul style="list-style-type: none"> - Variable Acceleration <p>Year 12 Exams</p> <p>Pure 2</p> <ul style="list-style-type: none"> - Functions and Graphs - Radians - Trigonometric Functions
EXPLANATION	<p>In the advent term you will learn most of the Pure content. This “theory” side of the course.</p> <p>In the first five chapters you master some of the fundamentals of A level mathematics which you studied at GCSE. You cover some new ground such as the discriminant in <i>Quadratics</i>.</p> <p>In <i>Algebraic methods</i> you study how to construct different kinds of formal proof and apply them to some of the areas previously covered.</p> <p>You study <i>Differentiation</i> for the first time – a fundamental concept in A Level Mathematics.</p>	<p>You finish the pure content in Lent term through the study of how to solve <i>Trigonometric Equations</i> and also looking at Integration – the inverse process of differentiation.</p> <p>The majority of the term looks at the “applied” side of the course: Statistics and Mechanics.</p> <p>In Statistics you are introduced to sampling techniques, standard deviation and variance. You also study probability distributions of discrete random variables and how to apply the binomial expansion to them. You get to base your learning on the <i>Large Data Set</i>, comprising of data from weather stations from around the world.</p> <p>In Mechanics you are introduced to forces, how they act on objects and how we model particular situations. Throughout the chapters we apply SUVAT and Newton’s laws to problems that involve pulleys, lifts and cars dragging trailers!</p>	<p>In the final term we finish statistics with Hypothesis Testing – whereby you learn how to measure the reliability of an outcome of a test statistic.</p> <p>You finish Mechanics in Variable Acceleration, where you use differentiation and integration from Pure 1 to model real life problems</p> <p>Following the Year 12 exams, you will start the Year 13 content. You will study <i>Function and Graphs</i>. You will learn what <i>Radians</i> are – which are key to trigonometry and calculus in Year 13. You will also learn about <i>Trigonometric Functions</i> and the reciprocals of sin, cos and tan!</p>

YEAR 13

	ADVENT	LENT	PENTECOST
TOPIC	<p>Pure 2</p> <ul style="list-style-type: none"> - Algebraic Methods - Sequences and Series - Binomial Expansion - Numerical Methods - Parametric Equations - Differentiation - Trigonometry and Modelling - Vectors 	<p>Pure 2</p> <ul style="list-style-type: none"> - Integration <p>Statistics 2</p> <ul style="list-style-type: none"> - Correlation and Regression - Conditional Probability - Normal Distribution <p>Mechanics 2</p> <ul style="list-style-type: none"> - Moments - Forces and Friction - Projectiles - Application of Forces - Further Kinematics 	
EXPLANATION	<p>You begin year 13 by extending your knowledge of Algebraic Methods through learning about proof by contradiction.</p> <p>The <i>Sequences and Series</i> content helps you understand the theory behind infinite series in <i>Binomial Expansion</i></p> <p><i>Parametric Equations</i> help you model two variables against a third such as time. This is a crucial skill later for <i>Differentiation</i> and <i>Integration</i>, in which you learn many new methods including: the chain and reverse chain rules; the quotient rule and differential equations.</p> <p>In <i>Trigonometry and Modelling</i> you learn important new identities to help you throughout Pure 2 as well as $R\sin\alpha$, which is commonly applied to cyclical problems.</p> <p>You will continue studying <i>Vectors</i> from Year 12 but will venture into 3D vectors for the first time</p>	<p>After finishing Pure 2, you will finish Year 13 through the study of the next Statistics and Mechanics chapters.</p> <p>Statistics 2 starts with <i>Correlation and Regression</i> which looks at non-linear modelling, which is an extension from Year 12. <i>Conditional Probability</i> looks deeper at the chance of outcomes occurring given that other events may have happened. Lastly, <i>Normal Distribution</i> studies the probability distribution of continuous data – which is a leap from discrete random variables in Year 12. It also should be said that Hypothesis testing is included in Correlation and Normal Distribution in Statistics 2.</p> <p>Mechanics 2 continues the theme calculating with forces on objects. You will study Friction for the first time. In the study of Projectiles you will learn how to solve problems involving particles being projected at an angle.</p> <p>In Application of forces you return to solving problems involving connected particles, previously studied in Mechanics 1. Lastly you will end on Further Kinematics, were you will use differentiation and integration with vectors and functions of time</p>	Revision and Exams

YEAR 12 FURTHER MATHS

As Further Mathematicians, you will have three extra hours of Maths a week. This means that will complete the vast majority of the normal Year 12 content in the Advent term. This will give you the foundational knowledge to begin meaning the Further Maths content, which spans across the Lent term and prepares you for your external Further Maths AS exam in May.

	CORE PURE	FURTHER STATISTICS	FURTHER MECHANICS
TOPIC	<ul style="list-style-type: none"> - Complex Numbers - Argand Diagrams - Series - Roots of Polynomials - Volumes of Revolution - Matrices - Linear Transformations - Proof by Induction - Vectors 	<ul style="list-style-type: none"> - Discrete Random Variables - Poisson Distributions - Hypothesis Testing - Chi-squared tests 	<ul style="list-style-type: none"> - Momentum and Impulse - Work, Energy and Power - Elastic Collisions in one dimension
EXPLANATION	<p>We introduce the study of <i>Complex Numbers</i>, learning what they are and how to visualise them with <i>Argand Diagrams</i>.</p> <p>We then look at the summation of particular <i>Series</i></p> <p><i>Roots of polynomials</i> builds on your Year 12 knowledge of solving two higher polynomials</p> <p><i>Volumes of revolution</i> builds on your Year 12 knowledge of integration so we can find the size of a volume</p> <p><i>Matrices</i> is a new concept, developed further in Linear transformations to see how they are used.</p> <p>We build on our knowledge of Year 12 proof through <i>Proof by Induction</i>.</p> <p>We finish by building our knowledge of <i>Vectors</i>, looking into how things can be modelled in 3 dimensions and understanding relations and distances between them</p>	<p>Further Statistics delves in deeper in the study of the accuracy of statistical tests.</p> <p>We begin by looking at the expected values and variance of <i>Discrete random variables</i>, which combined with Year 12 statistics prepares you for the study of <i>Poisson Distribution</i>. Here you will learn how to use the mean and variance of a Poisson distribution and how to apply this to real life contexts.</p> <p>You will then be able to do <i>Hypothesis tests</i> (studied already) but this time with the Poisson Distribution.</p> <p>Lastly you will be introduced to <i>Chi-squared tests</i>, where you will use degrees of freedom and apply goodness of fit tests.</p>	<p>We introduce the idea of collisions in our <i>Momentum and Impulse</i> topic with particles colliding on a plane.</p> <p>In <i>Work, Energy and Power</i> we build on our knowledge from Y12 Mechanics working with forces on particles. We introduce the ideas of kinetic and gravitational energy, learning about friction and driving forces along the way.</p> <p>After the introduction of colliding particles earlier in the unit, we look at the before and after of collisions.</p>

YEAR 13 FURTHER MATHS

	CORE PURE	Further statistics	Further mechanics
TOPIC	<ul style="list-style-type: none"> - Complex numbers - Series - Method in Calculus - Volumes of Revolution - Polar Coordinates - Hyperbolic Functions - Methods in Differential Equations - Modelling with Differential Equations 	<ul style="list-style-type: none"> - Geometric and Negative Binomial Distributions - Hypothesis Testing - Central Limit Theorem - Probability Generating Functions - Quality of tests 	<ul style="list-style-type: none"> - Momentum and Impulse - Elastic Strings and Springs - Elastic Collisions in 2D
EXPLANATION	<p><i>Polar coordinates</i> builds on your y13 knowledge of parametric equations</p> <p>In <i>Series</i>, you will learn how polynomials can be written as a series</p> <p><i>Volumes of revolution</i> builds on the work you started in this topic in year 12</p> <p><i>Hyperbolic functions</i> extends from Year 13 trigonometry, using lots of new identities</p> <p><i>Methods in Calculus</i> prepares you for the content covered in <i>Methods in differential equations</i> and <i>Modelling with Differential Equations</i></p>	<p>Year 13 Further statistics carries on the theme of importance of summary statistics such as the mean and variance through how to find them in <i>Geometric and Negative Binomial Distributions</i></p> <p>You will then have the knowledge to be able finish <i>Hypothesis Testing</i>.</p> <p><i>Central Limit Theorem</i> extends your knowledge of Normal Distribution</p> <p><i>You will learn about Probability Generating Functions</i> and how these apply to Poisson and Binomial Distributions</p> <p>Lastly, you will learn about the <i>Quality of tests</i>, where you will explore Type 1 and Type 2 errors</p>	<p>Building on ideas explored in Year 12, we look at <i>Momentum and Impulse</i> using vectors.</p> <p>We introduce a new topic of <i>Elastic Springs and Springs</i>, building on your prior knowledge of energy through introducing elastic potential energy. We combine all our knowledge at the end by resolving entire systems.</p> <p>Building on our knowledge from Year 12, we look at particles colliding on a plane.</p>

YEAR 12 LEVEL 3 CORE MATHS

TOPIC	Data and Sampling	Personal Finance	Correlation and Regression	Normal Distribution and Confidence Intervals	Preliminary Material and Critical Analysis	Fermi Estimation
EXPLANATION	<p><i>Data and Sampling</i> covers much of the statistical knowledge from GCSE that is required to access the rest of the content in this course.</p> <p>In <i>Personal Finance</i> you will learn about the world of tax, banking, mortgages and exchange rates.</p> <p>In <i>Correlation and Regression</i>, you learn how to use lines of best fit as linear models</p> <p>You will then learn about the <i>Normal Distribution</i>, how it can be applied to real life statistical distributions, and what confidence intervals are.</p> <p>You then study the <i>Preliminary Material</i> that you will be assessed on in your external examination before finally learning about <i>Fermi Estimation</i> and how this technique can be used to make good and approximate calculations.</p>					