

Curriculum Content Map													
Subject: Year 12 Maths													
Month		September	October	November	December	January	February	March	April	May	June	July	
Units of Work		1. Algebraic Expressions 2. Quadratics PURE MATHEMATICS	1. Equations and Inequalities 2. Graphs and Transformations PURE MATHEMATICS	1. Straight Line Graphs 2. Circles 3. Algebraic Methods PURE MATHEMATICS	Binomial Expansion PURE MATHEMATICS	1. Trigonometric Ratios 2. Trigonometric Identities and Equations 3. Vectors PURE MATHEMATICS	Differentiation PURE MATHEMATICS	1. Integration 2. Exponentials and Logarithms PURE MATHEMATICS	1. Data Collection 2. Measures of Location and Spread STATISTICS	1. Representation of Data 2. Correlation 3. Probability 4. Statistical Distributions STATISTICS	1. Hypothesis Testing STATISTICS 2. Modelling Mechanics 3. Constant Acceleration 4. Forces MECHANICS	1. Variable Acceleration MECHANICS 2. Algebraic Methods 3. Functions and Graphs PURE MATHEMATICS	
AS & A-Level Content		1. "Understand and use the laws of indices for all rational exponents" "Use and manipulate surds, including rationalising the denominator" "Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem" 2. "Work with quadratic functions and their graphs; the discriminant of a quadratic function; including the conditions for real and repeated roots; completing the square; solving quadratic equations including solution of quadratic equations in a function of the unknown"	1. "Solve simultaneous equations in two variables by elimination and by substitution, including one linear and one quadratic equation" "Solve linear and quadratic inequalities in a single variable and interpret such inequalities graphically, including inequalities with brackets and fractions" "Represent linear and quadratic inequalities graphically" 2. "Understand and use graphs of functions; sketch curves defined by simple equations, including polynomials, interpret algebraic solution of equations graphically; use intersection points of graphs to solve equations" "Understand the effect of simple transformations on the graph of $y = f(x)$ including sketching associated graphs"	1. "Understand and use the equation of a straight line; gradient conditions for two straight lines to be parallel or perpendicular" "Be able to use straight line models in a variety of contexts" 2. "Understand and use the coordinate geometry of the circle including using the equation of a circle; completing the square to find the centre and radius of a circle; use of the following properties: • the angle in a semicircle is a right angle • the perpendicular from the centre to a chord bisects the chord • the radius of a circle at a given point on its circumference is perpendicular to the tangent to the circle at that point" 3. "Understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion; use methods of proof, including proof by deduction, proof by exhaustion" "Disproof by counter example"	"Understand and use the binomial expansion for positive integer n ; the notations $n!$ and nCr ; link to binomial probabilities"	1.8.2 "Understand and use the definitions of sine, cosine and tangent for all arguments; the sine and cosine rules; the area of a triangle in the form $\frac{1}{2}ab\sin C$ " "Understand and use the sine, cosine and tangent functions; their graphs, symmetries and periodicity" "Understand and use $\sin^2 x + \cos^2 x = 1$ " "Solve simple trigonometric equations in a given interval, including quadratic equations in $\sin x$, $\cos x$ and $\tan x$ and equations involving multiples of the unknown angle" 3. "Use vectors in two dimensions" "Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form" "Add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars, and understand their geometrical interpretation" "Understand and use position vectors; calculate the distance between two points represented by position vectors" "Use vectors to solve problems in pure mathematics and in context, including forces"	1.8.2 "Understand and use the definitions of sine, cosine and tangent for all arguments; the sine and cosine rules; the area of a triangle in the form $\frac{1}{2}ab\sin C$ " "Understand and use the sine, cosine and tangent functions; their graphs, symmetries and periodicity" "Understand and use $\sin^2 x + \cos^2 x = 1$ " "Solve simple trigonometric equations in a given interval, including quadratic equations in $\sin x$, $\cos x$ and $\tan x$ and equations involving multiples of the unknown angle" 3. "Use vectors in two dimensions" "Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form" "Add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars, and understand their geometrical interpretation" "Understand and use position vectors; calculate the distance between two points represented by position vectors" "Use vectors to solve problems in pure mathematics and in context, including forces"	"Understand and use the derivative of $f(x)$ as the gradient of the tangent to the graph of $y = f(x)$ at a general point (x, y) ; the gradient of the tangent as a limit; interpretation as a rate of change; sketching the gradient function for a given curve; second derivatives; differentiation from first principles for small positive integer powers of x " "Understand and use the second derivative as the rate of change of gradient" "Differentiate $\sin x$, for rational values of n , and related constant multiples, sums and differences" "Apply differentiation to find gradients, tangents and normals, maxima and minima and stationary points" "Identify where functions are increasing or decreasing"	1. "Know and use the Fundamental Theorem of Calculus" "Integrate an (including $n = -1$), and related sums, differences and constant multiples" "Evaluate definite integrals; use a definite integral to find the area under a curve" 2. "Know and use the function $x \ln x$ and its graph, where x is positive" "Know and use the function $\ln x$ and its graph" "Know and use the definition of $\ln a$ as the inverse of e^x , where a is positive and $x > 0$ " "Know and use the function x^a and its graph" "Know and use the definition of a^x as the inverse function of $\ln x$ " "Understand and use the laws of logarithms" "Solve equations of the form $a^{bx+c} = d$ " "Use logarithmic graphs to estimate parameters in relationships, given data for x and y " "Understand and use exponential growth and decay; use in modelling (examples may include the use of i in continuous compound interest, radioactive decay, drug concentration decay, exponential growth as a model for population growth); consideration of limitations and refinements of exponential models"	1. "Understand and use the terms 'population' and 'sample'" "Use samples to make informal inferences about the population" "Understand and use sampling techniques, including simple random sampling and opportunity sampling" "Select or critique sampling techniques in the context of solving a statistical problem, including understanding that different samples can lead to different conclusions about the population" 2. "Interpret measures of central tendency and variation, extending to standard deviation" "Be able to calculate standard deviation, including from summary statistics"	1. "Interpret diagrams for single-variable data, including understanding that area in a histogram represents frequency" "Connect to probability distributions" "Recognise and interpret possible outliers in data sets and statistical diagrams" "Select or critique data presentation techniques in the context of a statistical problem" "Be able to clean data, including dealing with missing data, errors and outliers" 2. "Interpret scatter diagrams and regression lines for bivariate data, including recognition of scatter diagrams which include distinct sections of the population (calculations involving regression lines are excluded)" "Understand informal interpretation of correlation" "Understand that correlation does not imply causation" 3. "Understand and use mutually exclusive and independent events when calculating probabilities" "Link to discrete and continuous distributions" 4. "Understand and use simple, discrete probability distributions (calculation of mean and variance of discrete random variables is excluded), including the binomial distribution, as a model; calculate probabilities using the binomial distribution"	1. "Understand and apply the language of statistical hypothesis testing, developed through a binomial model: null hypothesis, alternative hypothesis, significance level, test statistic, 1-tail test, 2-tail test, critical value, critical region, acceptance region, p-value" "Conduct a statistical hypothesis test for the proportion in the binomial distribution and interpret the results in context" "Understand that a sample is being used to make an inference about the population and appreciate that the significance level is the probability of incorrectly rejecting the null hypothesis" 3. "Understand, use and derive the formulae for constant acceleration for motion in a straight line" 4. "Understand the concept of a force; understand and use Newton's first law" "Understand and use Newton's second law for motion in a straight line (restricted to forces in two perpendicular directions or simple cases of forces given as 2-D vectors)" "Understand and use weight and motion in a straight line under gravity; gravitational acceleration g , and its value in S.I. units to varying degrees of accuracy" "The inverse square law for gravitation is not required and g may be assumed to be constant, but students should be aware that g is not a universal constant but depends on location" "Understand and use Newton's third law; equilibrium of forces on a particle and motion in a straight line"	1. "Understand and use derived quantities and units: velocity, acceleration, force, weight" "Understand and use the language of kinematics: position; displacement; distance travelled; velocity; speed; acceleration" 2. "Prove by contradiction (including proof of the irrationality of $\sqrt{2}$ and the infinity of primes, and application to unfamiliar proofs)" "Simplify rational expressions including by factorising and cancelling, and algebraic division (by linear expressions only)" "Decompose rational functions into partial fractions (denominators not more complicated than squared linear terms and with no more than 3 terms, numerators constant or linear)" 3. "Understand and use composite functions; inverse functions and their graphs" "Use of functions in modelling, including consideration of limitations and refinements of the models"
	Substantive Knowledge	The What!	1. Index Laws Expanding Brackets Factoring Negative and Fractional Indices Surds, including rationalising denominator 2. Solving quadratics, including completing the square Functions Quadratic graphs The discriminant Modelling with quadratics	1. Simultaneous Equations, including Inequalities, including quadratic and on a graph Regions of inequalities 2. Cubic Graphs Quartic Graphs Reciprocal Graphs Translating Graphs Sketching Graphs Transforming Functions	1. Equations of straight lines Parallel and Perpendicular lines 2. Midpoints and perpendicular bisectors Equation of a circle Tangents and Chords Circles and triangles 3. Algebraic fractions Dividing polynomials Factor Theorem Proof	Pascal's Triangle Factorial notation Binomial expansion Solving binomial problems Binomial estimation	1. Cosine Rule Sine Rule Area of Triangle (sine rule) Graphs of sine, cosine and tangent, including transformation of graphs 2. Angles in quadrants Trigonometric identities Trigonometric equations 3. Vectors, including representing vectors Magnitude and direction Position vectors	Gradients of curves Finding the derivative Differentiating an Differentiating quadratics Differentiating functions with two or more terms Gradients, tangents and normal Increasing and decreasing functions Second order derivatives Stationary points Sketching gradient functions	1. Integrating in Indefinite integrals Finding functions Definite integrals Areas under curves and the x-axis Areas between curves and lines 2. Exponential functions $y = e^x$ Logarithms, including laws of logarithms Solving equations using logarithms Natural logarithms Logarithms and non-linear data	1. Populations and samples Sampling, including non-random Types of data 2. Measures of central tendency and spread Means and standard deviation Coding	1. Outliers Box Plots Cumulative Frequency Histograms 2. Correlation Linear Regression 3. Calculating probabilities Venn diagrams Mutually exclusive and independent events Tree diagrams 4. Probability distributions Binomial distributions Cumulative probabilities	1. Hypothesis Testing Finding critical values One-tailed tests Two-tailed tests 2. Constructing a model Modelling assumptions Quantities and units Working with vectors 3. Displacement-time graphs Velocity-time graphs Constant acceleration formulae Vertical motion under gravity 4. Force diagrams Forces as vectors Forces and acceleration Motion in 2 dimensions Connected particles	1. Functions of time Using differentiation Maxima and Minima Using integration 2. Proof by contradiction Algebraic Fractions Partial Fractions Repeated factors Algebraic division 3. The modulus function Functions and mappings Composite functions Inverse functions Combining transformations
	Disciplinary Knowledge	The How!	Students will be encouraged to sketch graphs which is a key skill for them to develop. Students will also complete practice questions and past exam questions. Students will also be encouraged to start developing their own questions and also mark schemes.	These topics are also very much graph based and so students will be encouraged to draw, sketch and manipulate and amend graphs. Students will complete practice questions and also past exam questions. Students will also be encouraged to create and develop their own questions on these topics and link them to the previous topics.	This is also a big month for graphs and students should be adept at sketching these. They will continue to develop their skills in this area. Students will also focus on the skill of proof and how to best present proofs in order to convey clarity. Students will complete practice questions and also past exam questions. Students will also be encouraged to create and develop their own questions on these topics and link them to the previous topics. Students will also need to start critiquing the questions that other students have made.	One of the skills key to this topic is estimation. Students will need to understand how binomial expansion can be used as the basis of estimation. Students will complete practice questions and also past exam questions. Students will also be encouraged to create and develop their own questions on these topics and link them to the previous topics. Students will also need to start critiquing the questions that other students have made.	Triangles and understanding the unity circle are key to these topics. Students will be encouraged to develop their skills of sketching and labelling geometric shapes, angles and graphs. Students will complete practice questions and also past exam questions. Students will also be encouraged to create and develop their own questions on these topics and link them to the previous topics. Students will also need to start critiquing the questions that other students have made.	Students are back to graphs and sketching graphs in order to understand the concept of differentiation. Students will learn the skills needed in order to find and sketch graphs of differentials will need to relate these to gradients. Students will complete practice questions and also past exam questions. Students will also be encouraged to create and develop their own questions on these topics and link them to the previous topics.	This is an opportunity for students to think about modelling real world situations using logarithms and exponentials. Students will also need to practice sketching graphs in order to find the areas underneath them and to find gradients of tangents.	Students should be encouraged to collect their own data and to engage with real life data in order to help with understanding this content. Students will also further develop their graphing skills - this time with a focus on scatter graphs and statistical analysis. Students should be encouraged to engage with past exam questions, mark schemes and examiners reports. Students should also continue to develop and share their own creative.	Graphs are still important in these topics and students will need to apply the skills they have already accumulated. Students can still collect primary data in order to better understand probability. There are also some nice probability applications that can form the basis of discussions and short trials in lessons. Students will still need to work through problems on these topics. They should still be developing and sharing ideas	Use of practical applications should be part of the 'how' in this mechanics topic. This could include measurements of real situations and also collection of data to verify relationships through experimentation.	Lots of practice needed for proofs and students will learn how to present proofs effectively so as to maximise marks available. Students will need to really engage with the mark schemes on these topics as this is an area where there are often multiple methods to achieve the same outcome
	Sequencing (Flow)	Retrieval & Extension	1. Builds from KS4; Indices Expanding and Factorising Surds Further develops in Y13: Algebraic Methods Proof Binomial Expansion 2. Builds from KS4; Solving quadratics Quadratic graphs Further develops in Y13: Functions and graphs	1. Builds from KS4; Simultaneous Equations Inequalities Further develops in Y13: Differentiation and integration 2. Builds from KS4; Cubic and Reciprocal Graphs Sketching Graphs Further develops in Y13: Functions and Graphs	1. Builds from KS4; Sine rule Circle theorems Further develops in Y13: Radians 3. Builds from KS4; Algebraic fractions Proof Further develops in Y13: Algebraic methods	Builds from KS4; Expanding and factorising Sequences Further develops in Y13: Binomial expansion, including partial fractions	1. Builds from KS4; Cosine Rule Sine Rule Area of triangle (sine rule) Graphs of sine, cosine and tangent Further develops in Y13: Trigonometric functions Trigonometry and modelling 2. Builds from KS4; Trigonometry in right-angled triangles Further develops in Y13: Trigonometric functions Trigonometry and modelling 3. Builds from KS4; Column vectors Further develops in Y13: Vectors in 3D	Builds from KS4; Quadratic graphs Further develops in Y13: Differentiating \sin and \cos Differentiating exponentials and logarithms Chain rule Product rule Parametric differentiation Implicit differentiation Using second derivatives Rates of change	1. Builds from KS4; Areas on graphs Further develops in Y13: Further integration 2. Builds from KS4; Solving equations Normal distribution	1. Builds from KS4; Cumulative Frequency Box Plots Histograms 2. Builds from KS4; Scatter Graphs Further develops in Y13: Measuring correlation Hypothesis testing for correlation 3. Builds from KS4; Calculating Probability Venn Diagrams Mutually Exclusive Events Tree Diagrams Further develops in Y13: Conditional probability 4. Further develops in Y13: Normal distribution	1. Builds from KS4; Independent Research Projects and Drawing Conclusions Further develops in Y13: Hypothesis testing for zero correlation 2. Builds from KS4; Units Vectors 3. Builds from KS4; Velocity-Time Graphs Further develops in Y13: Variable acceleration in one dimension 4. Builds from KS4; Vectors Further develops in Y13: Forces and Friction Application of Forces	1. Builds from Y12; Differentiation Integration 2. Builds from Y12; Algebraic methods 3. Builds from Y12; Graphs and transformations	
Summative Assessment		Regular End of unit assessments	End of unit assessments using the Pearson Active learn resources	AP1 Assessment - Whole School Data Collection	End of unit and reflection on the AP1 assessment. Past exam questions to fill knowledge gaps for the AP3 should be used for AFL in the lessons	End of unit assessments using the Pearson active learn resources	End of unit assessments using the Pearson active learn resources	AP2 Assessment - Whole School Data Collection Review Exercise 3	End of unit and reflection on the AP2 assessment. Past exam questions to fill knowledge gaps for the AP3 should be used for AFL in the lessons	End of unit assessments using the Pearson active learn resources	AP3 Assessment - Whole School Data Collection	End of unit and reflection on the AP3 assessment. Past exam questions to fill knowledge gaps for the AP3 should be used for AFL in the lessons	
Personal Empowerment	Virtue	Friendliness & Civility	Justice & Truthfulness	Courage	Generosity	Gratitude	Good Speech	Good Temper & Humour	Self-Mastery	Compassion	Good Sense		
	Link to Virtue	The opportunity to reflect, think deeply and critically about an issue. Students will demonstrate friendliness and civility as they help each other to revise and improve on their algebraic knowledge from KS4.	Students will look at how graphs and scales can be manipulated to hide the 'truth'	Students will need to be brave in terms of tackling new topics. They should be encouraged to make and share mistakes that they are making in order to deepen their understanding and the understanding of others	Students should be generous with their time in order to support each other both academically and emotionally around the AP1 assessment period	Students should be taught about the work of early mathematicians and scientists and should be encouraged to show gratitude for the work that these pioneers have done to benefit us and humanity.	This is one of the topics that students find tricky. They should be encouraged to demonstrate good speech and be open about how they are finding the topic and to share ideas on how to tackle problems.	Tackling integration for the first time, it will be important for students to demonstrate good temper! This like differentiation is a tricky topic when first introduced and students will need to remain open minded	Students will have some skills for data collection from GCSE. This will be an opportunity for the students to focus on mastery of this skill during work on statistics as it is introduced this year.	Students will consider compassion for each other at the potentially stressful time around the AP3 end of year assessments.	Students will be reviewing the AP3 results and will need to demonstrate good sense in which data can be represented. Discussions on the suitability of graphs will be key to students self mastery of these concepts	Students will be reviewing the AP3 results and will need to demonstrate good sense in which data can be represented. Discussions on the suitability of graphs will be key to students self mastery of these concepts	
Preparation for Work	Skill	Listening	Leadership	Problem-Solving	Creativity	Staying Positive	Speaking	Staying Positive	Aiming High	Speaking	Teamwork		
	Link to Skill	Students will need to listen carefully to understand how their previous learning will be stretched and challenge in algebra. Additionally, there is new content in quadratics that will be challenging if students do not listen.	Students will lead in their own learning as they build upon their previous KS4 learning to expand into this Y12 AS content	These topics naturally lend themselves to the skill of problem solving and their will be specific problem based questions in these topics for the students to try. These are denoted P in the text books	Students should be encouraged to create their own questions based on given parameters and mark schemes.	When tackling some of the newer concepts, students should stay positive in order to be resilient and complete longer problems	Students would be encouraged to speak through problems and share solutions to the rest of the group in order to build their confidence in the skill of speaking.	Matching well with the virtue of good temper, staying positive will be important when tackling the more complex problems and past exam questions	Students will need to reflect carefully on the AP2 exam results and use these as the basis of their revision. They should be encouraged to aim high in order to meet/exceed their target grades for the next round of assessments.	Students will need to focus on revision for the AP3 assessment which will be taking place during the next few weeks. Past exam papers and model solutions should be made available for students to help develop their exam skills.	Students will have the opportunity to demonstrate the skill of good speech during this month as they discuss new learning and in particular hypothesis testing.	There will be some opportunity for some practical based activities when studying acceleration as part of the mechanics units.	
Preparation for Citizenship	SMSC & British Values	Social Rule of Law	Social Democracy	Social Tolerance	Social Individual Liberty	Social Individual Liberty	Social Individual Liberty	Social Tolerance	Social Individual Liberty	Social Rule of Law	Social Rule of Law	Social Tolerance	
	Link to SMSC & British Values	Students will use their social skills to work together in groups and pairs to develop their understanding. Students will need to ensure they are fully confident with the 'rules' of algebraic laws in order to move past the first module and challenge themselves throughout the AS and A-Level course.	Students will use their social skills as they complete paired and group activities. Students will look at the moral repercussions of manipulating graphs and data. Students will demonstrate democracy as they work together to debate, discuss and make decisions about the kind of equation solving rules to use or graphs to draw	Students will need to demonstrate social skills when working together on problems. They will also need to be tolerant of each other when providing and receiving critique for work that they have produced and shared with each other.	Students will need to respect the individual liberties of others when they are being creative and working on problems and questions created by others. Students should also be encouraged to work independently and to value their own individualism during this topic	Students will need to respect the individual liberties of others when they are being creative and working on problems and questions created by others. Students should also be encouraged to work independently and to value their own individualism during this topic	In this topic the idea of individual liberty is important when linked to good speech. Students should be proud and confident when talking through work with the rest of the group and this should be respected by others in the group.	The value of tolerance fits nicely with the virtue of good temper in particular. Students should be encouraged to work collaboratively and to respect each other on problem solving. Where issues or conflict arises students should remind themselves of the need for tolerance of the views and approach of others.	Students should have the right to review their own learning from the AP assessment and their individual liberty should be observed by others. Some students may need longer and more support to review assessments and this should be linked to the idea of individual liberty and everyone's right to have quality time and input into this process.	There is an opportunity here to look at statistics in real contexts. Perhaps data on court hearings or outcomes of trials could be a focus in lessons. There could then be a discussion on the importance of British legal system in relationship to this data and its analysis	Having focused on British rules of law in the previous month when dealing with statistics and probability there is a nice opportunity to discuss physical law and the laws of nature. Newton's laws of motion the implications of a clockwork universe. Opportunity for some great discussions around freedom of choice and behaviour in a universe which is deterministic!	In starting the A2 content students will need to be particularly tolerant of each other and also staff when tackling new and unfamiliar content which will challenge understanding.	

Cultural Transmission