AS Maths (Over two years) Curriculum Map

YEAR 12	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	**PURE Algebra and Functions** • Algebraic expressions • Quadratic functions • Equations and Inequalities • Graphs and transformations	**PURE Coordinate geometry in the (x, y) plane** • Straight line graphs • Circles	**PURE Further algebra** • Algebraic division • Factor theorem • Proofs • Binomial expansion	**PURE Trigonometry** • Trig ratios and graphs • Trig identities and equations **PURE Vectors** • 2D vectors • magnitude and direction • Geometric problems	**PURE Calculus** • Differentiation • Integration	**STATISTICS Statistical Sampling** • Data collection • Measure of location and spread **STATISTICS Data representation and interpretation** • Representations of data
Skills	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts
Key Questions	Algebraic expressions Completing the square Inequalities Graphs and transformations	Equation of a straight line Equation of a straight line	Factor theorem Proof Binomial expansion	Sine-Cosine-Area Solve trig equations Vectors	First principles Differentiation Sampling	Interpolation and standard deviation Box plots Histograms

Assessment	Baseline Test Topic Tests Consolidation exam questions at the end of every lesson	Topic Tests Consolidation exam questions at the end of every lesson	Topic Tests Consolidation exam questions at the end of every lesson	Topic Tests Consolidation exam questions at the end of every lesson	Topic Tests Consolidation exam questions at the end of every lesson	End of Year Mocks Topic Tests Consolidation exam questions at the end of every lesson
Literacy/numeracy/SMSC/Character	**Further Reading** ● ***The Code Book* – Simon Singh** ● ***The Music of the Primes* – Marcus du Sautoy** ● ***Thinking About Mathematics* – Stewart Shapiro** ● ***Chaos, Making a New Science* – James Gleick** ● ***Alex's Adventures in Numberland: Dispatches from the Wonderful World of Numbers* – Alex Belllos** ● **It *Must be Beautiful: Great Equations of Modern Science* – edited by Graham Farmeloâ ‹** ● ***The Problems of Mathematics, Nature's Numbers, From Here to Infinity, Game, Set and Math and The Magical Maze* – Ian Stewart** ● ***What is Mathematics?* – Courant and Robbins** ● ***Mathematics: The Golden Age* – Devlin** ● ***A Mathematician's Apology* – Hardy** ● ***Makers of Mathematics* – Hollingdale**		**Key Words** <u>PURE Algebra and Functions</u> Expression, function, constant, variable, term, unknown, coefficient, index, linear, identity, simultaneous, elimination, substitution, factorise, completing the square, intersection, change the subject, cross-multiply, power, exponent, base, rational, irrational, reciprocal, root, standard form, surd, rationalise, exact, manipulate, sketch, plot, quadratic, maximum, minimum, turning point, transformation, translation, polynomial, discriminant, real roots, repeated roots, factor theorem, quotient, intercepts, inequality, asymptote <u>PURE Coordinate geometry in the (x, y) plane</u> Equation, bisect, centre, chord, circle, circumcircle, coefficient, constant, diameter, gradient, hypotenuse, intercept, isosceles, linear, midpoint, parallel, perpendicular, proportion, Pythagoras, radius, right angle, segment, semicircle, simultaneous, tangent. <u>PURE Further algebra</u> Binomial, coefficient, probability, proof, assumptions, deduction, exhaustion, disproof, counter-example, polynomials, factorisation, quadratic, cubic, quartic, conjecture, prediction, rational number, implies, necessary, sufficient, converse, fully factorise, factor, expand, therefore, conclusion. <u>PURE Trigonometry</u> Sine, cosine, tangent, interval, period, amplitude, function, inverse, angle of elevation, angle of depression, bearing, degree, identity, special angles, unit circle, symmetry, hypotenuse, opposite, adjacent, intercept <u>PURE Vectors</u> Vector, scalar, magnitude, direction, component, parallel, perpendicular, modulus, dimension, ratio, collinear, scalar product, position vectors <u>PURE Calculus</u> Differentiation, derivative, first principles, rate of change, rational, constant, tangent, normal,		

		increasing, decreasing, stationary point, maximum, minimum, integer, calculus, function, parallel, perpendicular <u>STATISTICS Statistical Sampling</u> Population, census, sample, sampling unit, sampling frame, simple random sampling, stratified, systematic, quota, opportunity (convenience) sampling. <u>STATISTICS Data representation and interpretation</u> Histogram, box plot, probability density function, cumulative distribution function, continuous random variable, scatter diagram, linear regression, explanatory (independent) variables, response (dependent) variables interpolation, extrapolation, product moment correlation coefficient (PMCC), mean, median, mode, variance, standard deviation, range, interquartile range, interpercentile range, outlier, skewness, symmetrical, positive skew, negative skew.	
Enrichment opportunities and futures	**Further Study** Mathematics Degree Related Degree Subjects More information: https://www.mathscareers.org.uk/degree-courses-a-level-mathematics/	**Career Paths** STEM subjects Insurance and Risk Data Science Computing Natural and Life Sciences Business and Operations Humanities Banking/Finance Business Operations	**Extracurricular at Haydon** Webinars Maths Works Maths Modelling Challenge MC3 Shared podcasts Online uni events

YEAR 13	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	
Content	**PURE Calculus** ● Integration **PURE Exponentials and logarithms** ● Exponential functions ● Logarithms ● Non linear data	**STATISTICS Data representation and interpretation** ● Correlation **STATISTICS Probability** ● Calculating probabilities ● Mutually exclusive and Independent events ● Probability distribution ● Binomial distributions ● Cumulative probabilities	**STATISTICS Hypothesis Testing** ● Critical values ● One tailed tests ● Two tailed tests **MECHANICS Constant Acceleration (Kinematics)** ● Modelling ● Vectors	**MECHANICS Constant Acceleration (Kinematics)** ● SUVAT ● Displacement time graphs ● Velocity time graphs ● Gravity **MECHANICS Forces & Newton's laws** ● Newton's first law ● Newton's second law ● Pulleys	Exam Preparation	
Skills	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts	AO1: Use and apply standard techniques. AO2: Reason, interpret and communicate mathematically AO3: Solve problems within mathematics and in other contexts

Key Questions	Integration Exponentials and Logs	Correlation and Regression Probability	Discrete Random Variables Mechanics- Vectors	Velocity - time graphs SUVAT F = ma Variable acceleration	
Assessment	Baseline Pure Mock assessment Topic Tests Consolidation exam questions at the end of every lesson	• Pure Practice Mock • Topic Tests • Consolidation exam questions at the end of every lesson	• Mock Exams • Topic Tests • Consolidation exam questions at the end of every lesson	• Practice Statistics Mock • Topic Tests • Consolidation exam questions at the end of every lesson	• Practice Mechanics Mock • External AS Exams: 1 paper in Pure and 1 paper in Statistics and Mechanics
Literacy	**Further Reading** • ***The Code Book* – Simon Singh** • ***The Music of the Primes* – Marcus du Sautoy** • ***Thinking About Mathematics* – Stewart Shapiro** • ***Chaos, Making a New Science* – James Gleick** • ***Alex's Adventures in Numberland: Dispatches from the Wonderful World of Numbers* – Alex Belllos** • **It *Must be Beautiful: Great Equations of Modern Science* – edited by Graham Farmeloâ ‹** • ***The Problems of Mathematics, Nature's Numbers, From Here to Infinity, Game, Set and Math and The Magical Maze* – Ian Stewart** • ***What is Mathematics?* – Courant and Robbins** • ***Mathematics: The Golden Age* –**		**Key Words** PURE Calculus Calculus, differentiate, integrate, reverse, indefinite, definite, constant, evaluate, intersection. PURE Exponentials and logarithms Exponential, exponent, power, logarithm, base, initial, rate of change, compound interest STATISTICS Data representation and interpretation Histogram, box plot, probability density function, cumulative distribution function, continuous random variable, scatter diagram, linear regression, explanatory (independent) variables, response (dependent) variables interpolation, extrapolation, product moment correlation coefficient (PMCC), mean, median, mode, variance, standard deviation, range, interquartile range, interpercentile range, outlier, skewness, symmetrical, positive skew, negative skew. STATISTICS Probability Sample space, exclusive event, complementary event, discrete random variable, continuous random variable, mathematical modelling, independent, mutually exclusive, Venn diagram, tree diagram. Binomial, probability, discrete distribution, discrete random variable, uniform, cumulative probabilities STATISTICS Hypothesis Testing Hypotheses, significance level, one-tailed test, two-tailed test, test statistic, null hypothesis,		

	Devlin • ***A Mathematician's Apology* – Hardy** • ***Makers of Mathematics* – Hollingdale**	alternative hypothesis, critical value, critical region, acceptance region, p-value, binomial model, accept, reject, sample, inference. <u>MECHANICS Constant Acceleration (Kinematics)</u> <u>Modelling</u> Modelling, smooth, rough, light, inelastic, inextensible, particle, rigid body, mass, weight, rod, plane, lamina, length, distance (m), displacement (m), velocity (m s–1), speed (m s–1), acceleration (m s–2), force (N), retardation (m s–2), newtons (N), scalar, vector, direction, magnitude, (normal) reaction, friction, tension, thrust, compression <u>MECHANICS Constant Acceleration (Kinematics)</u> <u>SUVAT</u> Force, newtons, mass, weight, gravity, tension, thrust, compression, air resistance, reaction, driving force, braking force, resultant, force diagram, equilibrium, inextensible, light, negligible, particle, smooth, uniform, pulley, string, retardation, free particle. <u>MECHANICS Forces & Newton's laws</u> Distance, displacement, velocity, speed, constant acceleration, variable acceleration, retardation, deceleration, gradient, area, differentiate, integrate, rate of change, straight-line motion, with respect to time, constant of integration, initial conditions.	
Enrichment opportunities and futures	**Further Study** Mathematics Degree Related Degree Subjects More information: https://www.mathscareers.org.uk/degree-courses-a-level-mathematics/	**Career Paths** STEM subjects Insurance and Risk Data Science Computing Natural and Life Sciences Business and Operations Humanities Banking/Finance Business Operations	**Extracurricular at Haydon** Webinars Maths Works Maths Modelling Challenge MC3 Shared podcasts Online uni events