A Level 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** Straight line graphs Circles **PURE Further algebra** Algebraic division Factor theorem Proofs	**PURE Further algebra** Binomial **PURE Trigonometry** Trig ratios and graphs Trig identities and equations **PURE Vectors** 2D vectors magnitude and direction Geometric problems **PURE Calculus** Differentiation	**PURE Calculus** Integration **PURE Exponentials and logarithms** Exponential functions Logarithms Non linear data **STATISTICS Statistical Sampling** Data collection Measure of location and spread **STATISTICS Data representation and interpretation** Representations of data **STATISTICS Data representation and interpretation** Correlation **MECHANICS Constant Acceleration (Kinematics)** Modelling Vectors	**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)** SUVAT Displacement time graphs Velocity time graphs Gravity **MECHANICS Forces & Newton's laws** Newton's first law	**PURE Algebra and Functions** Proofs Partial Fractions **PURE Algebra and Functions** Modulus function Mappings Composite functions Inverse functions	**PURE Sequences and Series** Arithmetic Geometric Sum to infinity Recurrence **PURE Algebra and Functions** The binomial expansion **PURE Trigonometry** Radians Area of sectors and segments Small angle approximation Trig functions Trig identities Inverse trig functions

				Newton's second law Pulleys		
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
Topic List	Algebraic expressions Completing the square Discriminant Inequalities Graphs and Transformations Equation of a straight line Equation of a circle Factor theorem Proof	Sine-Cosine- Area Binomial Expansion Solve trig Equations Vectors First Principles Differentiation	Integration Exp and Logs Sampling Interpolation and standard deviation Box plots Histograms Correlation and Regression Vectors - Mechanics	Probability Binomial-hypothesis-testing Discrete Random Variables Velocity- time graphs SUVAT F = ma Variable acceleration	Proof by Contradiction Partial Fractions Functions Graph Transformations	Arithmetic Sequence Geometric sequence Binomial Expansion recurrence notations Radians Small angle approximations Sec Cosec and Cot Trig Identities
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	End of Year Mocks Topic Tests Consolidation exam questions at the end of every lesson	Topic Tests Consolidation exam questions at the end of every lesson
Literacy/numeracy/SMSC/	**Further Reading** ● *The Code Book* – Simon Singh ● *The Music of the Primes* –		**Key Words** PURE Algebra and Functions			

| Character | **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** I*t 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** | 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

PURE Coordinate geometry in the (x, y) plane
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.

PURE Further algebra
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.

PURE Trigonometry
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

PURE Vectors
Vector, scalar, magnitude, direction, component, parallel, perpendicular, modulus, dimension, ratio, collinear, scalar product, position vectors

PURE Calculus
Differentiation, derivative, first principles, rate of change, rational, constant, tangent, normal, increasing, decreasing, stationary point, maximum, minimum, integer, calculus, function, parallel, perpendicular. 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 Statistical Sampling
Population, census, sample, sampling unit, sampling frame, simple random sampling, |

| | | stratified, systematic, quota, opportunity (convenience) sampling.

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, alternative hypothesis, critical value, critical region, acceptance region, p-value, binomial model, accept, reject, sample, inference.

MECHANICS Constant Acceleration (Kinematics)
Modelling
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

MECHANICS Constant Acceleration (Kinematics)
SUVAT
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.

MECHANICS Forces & Newton's laws
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

YEAR 13	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	
Content	**PURE Trigonometry** Formula Trig Identities Trig equations Parametric equations **PURE Vectors** 3D Vectors magnitude and direction Geometric problems **PURE Calculus** Differentiation	**PURE Calculus** Integration **PURE Numerical Methods** Roots Iteration Newton Raphson Method **MECHANICS Moments** Equilibrium Centres Tilting	**MECHANICS Forces & Newton's laws** Resolving forces Inclined planes Friction **MECHANICS Kinematics** Projectiles **STATISTICS Regression** Correlation Hypothesis testing **STATISTICS Probability** Conditional probability	**MECHANICS Forces & Newton's laws** Statics **MECHANICS Kinematics** Vectors Calculus **STATISTICS Distributions** Normal Distribution	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

Topic list	Arithmetic Sequence recurrence notations Geometric sequence Binomial Expansion Addition formulae R Formula Parametric equations Vectors - 3D	**Differentiating Sin x , Cos x** **Chain rule** Product Rule Quotient rule Differentiation Trig Iteration Newton Raphson **Implicit Differentiation** Iteration Newton Raphson Integration by parts Integrating Trig Trapezium Rules Integrating exponentials Integrating Parametric Integrating by substitution Differential Equations Moments	correlation hypothesis testing Non linear regressions Probability resolving forces Projectiles	**Normal distribution** appoximating a binomial Mean normal hypothesis testing Statics of rigid bodies Connected particles Resolving dynamics Vectors in Kinematics Vectors calculus	
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/num eracy/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*	**Key Words** **PURE Proof** Proof, verify, deduction, contradict, rational, irrational, square, root, prime, infinity, square number, quadratic, expansion, trigonometry, Pythagoras. **PURE Algebra and Partial Fractions** Polynomial, numerator, denominator, factor, difference of two squares, quadratic, power, index, coefficient, degree, squared, coefficients, improper, identity, algebraic fraction, partial fraction, rational.			

	the Wonderful World of Numbers – Alex Belllos ● I*t 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	**PURE Functions and modelling** Function, mapping, domain, range, modulus, transformation, composite, inverse, one to one, many to one, mappings, f(x), fg(x), f–1x, reflect, translate, stretch. **PURE Sequences and Series** Sequence, series, finite, infinite, summation notation, Σ(sigma), periodicity, convergent, divergent, natural numbers, arithmetic series, arithmetic progression (AP), common difference, geometric series, geometric progression (GP), common ratio, nth term, sum to n terms, sum to infinity ( ), limit. **PURE Binomial** Binomial, expansion, theorem, integer, rational, power, index, coefficient, validity, modulus, factorial, nCr, combinations, Pascal's triangle, partial fractions, approximation, converges, diverges, root. **PURE Trigonometry** Pythagoras, Pythagorean triple, right-angled triangle, opposite, adjacent, hypotenuse, trigonometry, sine, cosine, tangent, secant, cosecant, cotangent, SOHCAHTOA, exact, symmetry, periodicity, identity, equation, interval, quadrant, degree, radian, circular measure, infinity, asymptote, small angles, approximation, identity, proof. **PURE Parametrics** Parametric, Cartesian, convert, parameter t, identity, eliminate, substitute, circle, hyperbola, parabola, ellipse, domain, modelling. **PURE Vectors** Roots, continuous, function, positive, negative, converge, diverge, interval, derivative, tangent, chord, iteration, Newton-Raphson, staircase, cobweb, trapezium rule **PURE Calculus** Derivative, tangent, normal, turning point, stationary point, maximum, minimum, inflexion, parametric, implicit, differential equation, rate of change, product, quotient, first derivative, second derivative, increasing function, decreasing function. Integral, inverse, differential, coefficient, index, power, negative, reciprocal, natural logarithm, ln |x|, coefficient, exponential, identity, sin, cos, tan, sec, cosec, cot, ex, parametric. Integral, definite integral, integrand, limit, indefinite integral, constant of integration, trapezium, substitution, by parts, area, differential equation, first order, separating variables, initial conditions, general

		solution, parametric.
		PURE Numerical Methods Vector, scalar, column, 3D coordinates, vertices, Cartesian, i, j, k, magnitude, origin, distance, direction, angle, position vector, unit vector, orthogonal, vector addition/subtraction. **STATISTICS Regression** Hypotheses, significance level, one-tailed test, two-tailed test, test statistic, null hypothesis, alternative hypothesis, critical value, critical region, acceptance region, p-value, binomial model, correlation coefficients, product moment correlation coefficient, population coefficient, sample, inference, mean, normal distribution, variance, assumed variance, linear regression, interpolation, extrapolation, coded data **STATISTICS Probability** Sample space, exclusive event, complementary event, discrete random variable, continuous random variable, mathematical modelling, independent, mutually exclusive, Venn diagram, tree diagram, set notation, conditional probability, two-way tables, critiquing assumptions. **STATISTICS Distributions** Binomial, discrete distribution, discrete random variable, uniform, cumulative probabilities Normal, mean, variance, continuous distribution, histogram, inflection, appropriate probability distribution. **MECHANICS Moments** Moment, turning effect, sense, newton metre (N m), equilibrium, reaction, tension, rod, uniform, non-uniform, centre of mass, resolve, tilting, 'on the point', concurrent. **MECHANICS Forces & Newton's laws** Force, weight, tension, thrust, friction, coefficient of friction, μ, limiting, reaction, resultant, magnitude, direction, bearing, force diagram, equilibrium, inextensible, light, negligible, particle, smooth, rough, uniform, perpendicular. Force, resultant, component, resolving, plane, parallel, perpendicular, weight, tension, thrust, friction, air resistance, reaction, driving force, braking force, force diagram, equilibrium, inextensible, light, negligible, particle, rough, smooth, incline, uniform, friction, coefficient of friction, concurrent, coplanar. **MECHANICS Kinematics**

		Projectile, range, vertical, horizontal, component, acceleration, gravity, initial velocity, vector, angle of projection, position, trajectory, parabola. Distance, displacement, speed, velocity, constant acceleration, constant force, variable force, variable acceleration, retardation, deceleration, initial (t = 0), stationary (speed = 0), at rest (speed = 0), instantaneously, differentiate, integrate, turning point.
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