Code	**Name** and Key Concepts
MMu1t1	**Functions and graphs**: Lines, Quadratics, Inverse Proportions, Polynomials, Relations, Translations and Dilations
MMu1t2	**Trigonometric functions**: Unit Circle, Radians, SOH CAH TOA, Sine Rule, Exact Values, Amplitude/ Period/ Phase, Sum of Angles Identities
MMu1t3	**Counting and probability**: Binomial Coefficients, Set Complement Intersection and Union, Probability, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$, Conditional Probability, Independance
MMu2t1	**Exponential functions**: Index Laws, Fractional Indices, Functions, Asymptotes, Graphs
MMu2t2	**Arithmetic and geometric sequences and series**: Arithmetic and Geometric Sequences as Recurrence Relations, Limiting Behaviour, and Partial Sum Formulae, Growth and Decay
MMu2t3	**Introduction to differential calculus** Average Rate of Change, First Principles, Leibniz Notation, Instantaneous Rate of Change, Slope of Tangent, Derivitive of Polynomials, Linearity of Differentiation, Optimisation, Anti-Derivitives, Interpret Position-Time Graphs
MMu3t1	**Further differentiation and applications**: Define e as a s.t. $\lim_{h \to 0} \frac{a^h - 1}{h} = 1$, Derivitives of e^x $\sin(x)$ and $\cos(x)$, Chain Product and Quotient Rules, Second Derivitives
MMu3t2	**Integrals**: Integrate Polynomial Exponential and Trigonometric Functions, Linearity of Integration, Determine Displacement given Velocity, Definite Integrals, Fundamental Theorem of Calculus, (signed) Area Under a Curve
MMu3t3	**Discrete random variables**: Frequencies, General Properties, Expected Value, Variance, Standard Deviation, Bernoulli and Binomial Distribtions
MMu4t1	**The logarithmic function**: Logs as Inverse of Exponentials, Log-Scales, Log Function Graphs, Natural Log, $\frac{d}{dx}\ln(x) = \frac{1}{x}$, $\int \frac{1}{x} dx = \ln(x) + c$ for $x > 0$
MMu4t2	**Continuous random variables and the normal distribution**: Probability Density Function, Cumulative Distribution Function, Probabilites Expected Value, Variance and Standard Deviation as Integrals, Linear Transformation of Random Variables, Normal Distribution using Technology
MMu4t3	**Interval estimates for proportions** Simple Random Sampling, Bias, Sample Proportion, Normal Approximation to the Binomial Proportion, Wald Confidence Interval, Trade-Off Between Width and Level of Confidence
SMu1t1	**Combinatorics** Multiplication of Possibilities, Factorial Notation, Permutations with and without Repeated Objects, Union of Three Sets, Pigeon-Hole Principle, Combinations, Pascals Triangle
SMu1t2	**Vectors in the plane**: Magnetude and Direction, Scalar Multiplication, Addition and Substraction as a Triangle, Vector Notation, $a\mathbf{i} + b\mathbf{j}$ Notation, Scalar Dot Product, Projection, Parallel and Perpendicular Vectors
SMu1t3	**Geometry**: Notation for Implication ($\Rightarrow$) and Equivalence ($\Leftrightarrow$), Converse ($B \Rightarrow A$) Negation ($\neg A \Rightarrow \neg B$) and Contrapositive ($\neg B \Rightarrow \neg A$), Proof by Contradiction, $\forall$ and $\exists$ Notation, Counter-Examples, Circle Theorems, Quadrilateral Proofs in $\mathbb{R}^2$
SMu2t1	**Trigonometry**: Graph and Solve Trig Functions, Prove Various Trig Indentities, Reciprocal Trig Functions
SMu2t2	**Matrices**: Notation, Addition and Scalar Multiplication of Matrices, Multiplicative Identity and Inverse, Determinant, Matrices as Transformations
SMu2t3	**Real and complex numbers**: Rationality and Irrationality, Induction, $i = \sqrt{-1}$, Complex Numbers $a + bi$ and Arithmetic ($+$, $-$, $\times$, $\div$), Complex Conjugates, Complex Plane, Complex Conjugate Roots of Polynomials
SMu3t1	**Complex numbers**: Modulus and Argument, Arithmetic ($\times$, $\div$, and z^n) in Polar Form, Convert between Polar and Cartesian Form, De Moivre's Theorem, Roots of Complex Numbers, Factorising Polynomials
SMu3t2	**Functions and sketching graphs**: Composition of Functions, One-to-One, Inverse Functions, Absolute Value Function, Rational Functions
SMu3t3	**Vectors in three dimensions**: $a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$ Notation, Equation for Spheres, Parameterised Vector Equations, Equations of Lines, the Cross Product, Equation for a Plane, Systems of Linear Equation (Elimination Method) and Geometric Interpretation of Solutions, Kinematics via Differentiation of Vector Equations, Projectile and Circular Motion
SMu4t1	**Integration and applications of integration** Substitution, $\int \frac{1}{x} dx = \ln\lvert x\rvert + c$ for $x \neq 0$, Inverse Trig Functions and their Derivitives, Integrate $\frac{\pm 1}{\sqrt{a^2 - x^2}}$ and $\frac{a}{a^2 + x^2}$, Partial Fractions, Integration by Parts, Volume of Solids of Revolution, Numerical Integration using Technology
SMu4t2	**Rates of change and differential equations**: Implicit Differentiation, First-Order Seperable Differential Equations, The Logistic Equation, Kinematics (Rates of Change)
SMu4t3	**Statistical inference**: Central Limit Theorem and the Resulting Confidence Interval for a Mean
S1M1	**Functions and graphs**: Equations for a Line, Slope, y-intercept, Intersection of Lines, Reciprocal Function, Asymptotes, Functions vs Relations, Domain, Range, Function Notation
S1M2	**Polynomials**: Quadratic Equations in Vertex and Factorised Forms, Quadratic Formula, Completing the Square, The Leading Coefficient and Degree of a Polynomials, Cubics, Quartics
S1M3	**Trigonometry**: Pythagoras, SOH CAH TOA, Cosine Rule, Sine Rule, Unit Circle, Sine and Cosine Functions, Radians, Length of Arc, Area of Sector, Amplitude, Period, Phase, $\tan(x) = \frac{\sin(x)}{\cos(x)}$
S1M4	**Counting and statistics**: Factorial, Permutations, Multiplication Principle, Combinations, Discrete vs Continuous Random Variables, Mean, Median, Mode, Range, Interquartile Range, Standard Deviation, Normal Distribution,
S1M5	**Growth and decay**: Index and Logarithm Laws, Exponential Functions and their Graphs
S1M6	**Introduction to differential calculus**: Average Rate of Change, First Principles, Notation $f'(x) = \frac{df}{dx}$, $\frac{d}{dx} x^n = nx^{n-1}$, Linearity of Differentiation, Slope of Tangent, Increasing vs Decreasing, Local and Global Maxima and Minima, Stationary Points, Sign Diagram
S1M7	**Arithmetic and geometric sequences and series**: Arithmetic and Geometric Series as Recurrance Relations and Explicit Expressions, Partial Sums, Limiting Behaviour
S1M8	**Geometry**: Circle Properties, Proofs (Direct, Contradiction, and Contrapositive)
S1M9	**Vectors in the plane**: Component (column) vs $ai + bj$ Notation, Length and Direction, Linear Combinations of Vectors, Scalar Dot Product, Projection, Angle Between Two Vectors and Parallel/ Perpendicular, Geometric Proof
S1M10	**Further Trigonometry**: Sketch Trigonometric Functions with Translations and Dilations, Solve for Angles, Trigonometric Identities, Reciprocal Trigonometric Functions
S1M11	**Matrices**: Linear Combinations of Matrices, Matrix Multiplication, The Identity, Inverse Matrices, The 2×2 Inverse, The 2×2 Determinant, Linear Transformations (including rotations, reflections and composition)
S1M12	**Real and complex numbers**: Rationals, Irrationals, Interval Notation, Induction, $i = \sqrt{-1}$, Real and Imaginary Components, Complex Conjugates and Arithmetic, Argand Diagram, Modulus, Complex Roots of Polynomals
S2MM1	**Further differentiation and applications**: S1M6, Chain Product and Quotient Rules, $e = 2.718...$, $\frac{d}{dx} e^x = e^x$, $\frac{d}{dx} \sin(x) = \cos(x)$, $\frac{d}{dx} \cos(x) = -\sin(x)$, Second Derivatives, Concavity and Points of Inflection
S2MM2	**Discrete random variables**: Random Variables, Discrete vs Continuous, Probability Functions and Distributions, Properties of Probabilities, Frequency, Expected Value $E[X] = \sum xp(x) = \mu_X$, Standard Deviation $\sigma_X = \sqrt{\sum (x - \mu_X)^2 p(x)}$, Uniform Bernoulli and Binomial Distributions
S2MM3	**Integral calculus**: Anti-differentiation, If $F'(x) = f(x)$ then $\int f(x)dx = F(x) + c$, Reversing Chain Rule for $\int f(ax + b)dx$, Linearity of Integration, Finding the Constant of Integration, Area Under the Curve as Upper and Lower Sum Approximations, Definite Integral, Area Between Two Functions and Between a Negative Function and the x-axis, Fundamental Theorem of Calculus,
S2MM4	**Logarithmic functions**: Sketching $y = a\ln(b(x - c))$, $\frac{d}{dx}\ln(x) = \frac{1}{x}$, For $x > 0$ $\int \frac{1}{x} dx = \ln(x) + c$
S2MM5	**Continuous random variables and the normal distribution**: $P(X = x) = 0$, Probability Density Function, $\mu_X = \int_{-\infty}^{\infty} x f(x) dx$, $\sigma_X = \int_{-\infty}^{\infty} (x - \mu_X)^2 f(x) dx$, $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$, Standard Normal $Z = \frac{X - \mu}{\sigma}$, Simple Random Sampling, For $X \sim (\mu, \sigma)$ and $X_i \sim iidX$ Sampling Distributions of $S_n = \Sigma_{i=1}^n X_i$ $(n\mu, \sigma\sqrt{n})$ and $\bar{X}_n = \frac{S_n}{n}$ $(\mu, \frac{\sigma}{\sqrt{n}})$, If X is Normally Distributed, then so are S_n and $\bar{X}_n$, Central Limit Theorem (CLT)
S2MM6	**Sampling and confidence intervals**: Confidence Interval for a Mean using CLT $\left(\bar{x} - z^* \frac{s}{\sqrt{n}}\right) \leq \mu \leq \left(\bar{x} + z^* \frac{s}{\sqrt{n}}\right)$, Wald Interval for a Proportion
S2SM1	**Mathematical induction**: Initial Case and Induction Step
S2SM2	**Complex numbers**: Cartesian vs Polar Form, Real and Imaginary Components, Modulus and Argument, Arithmetic in both Cartesian and Polar Forms, de Moivre's Theorem including Negative and Fractional Powers, Geometric Properties of the Argand Plane, Complex Arithmetic as Transformations, n^{th} Roots of a Complex Number, Factorising Polynomials with Complex Roots
S2SM3	**Functions and sketching graphs**: Function Composition, Informal Intro to Domain and Range, One-to-One, Inverse Functions, Absolute Value Function, Graphing Rational Functions
S2SM4	**Vectors in three dimensions**: Notation, Equations of a Line in $\mathbb{R}^3$, Scalar Dot Product, Vector Cross Product, $\lvert\mathbf{a} \times \mathbf{b}\rvert$ is the Area of their Parallelogram, Equation for a Plane in $\mathbb{R}^3$, Systems of Linear Equations, Geometric Interpretation of No/Unique/Infinite Solutions to a System of Linear Equations in $\mathbb{R}^3$
S2SM5	**Integration techniques and applications**: Integration by Substitution, Using Trigonometric Identities for Integration, Derivatives of Inverse Trigonometric Functions (so $\int \frac{\pm 1}{\sqrt{a^2 - x^2}} dx$ and $\int \frac{a}{a^2 + x^2} dx$, Integration by Parts, Area Between two Curves, Volume of Solids of Revolution
S2SM6	**Rates of change and differential equations**: Implicit Differentiation, First-Order Seperable Differential Equations, The Logistic Differential Equation, Parameterised Curves, Example: if $\mathbf{v} = \frac{d}{dt}(x(t), y(t))$ is Velocity, $\lvert\mathbf{v}\rvert$ is Speed, and so the Arc Length along the Parameterised Curve is $\int_a^b \sqrt{\mathbf{v} \bullet \mathbf{v}} dt$, Trigonometric Parameterisations (unit circle, and non-circular parameterisations)
MS1	**Numbers & Functions**:
MS2	**Linear Functions**:
MS3	**Quadratic Functions**:
MS4	**Rational Functions**:
MS5	**Trigonometry I**:
MS6	**Trigonometry II**:
MS7	**Exponential Functions**:
MS8	**Logarithms**:
MT1	**Polynomials**:
MT2	**Matrices**:
MT3	**Vectors and Applications**:
MT4	**Systems of Linear Equations**:
MT6	**Differentiation**:
MT7	**Applications of Differentiation**:
MT8	**Exponential and Logarithm Functions**:
MT9	**Integration**: