CARDINAL NEWMAN CATHOLIC SCHOOL

Cardinal Newman School: Medium Term Plan Maths Year 12

Overview: Purpose? Mathematics underpins much of science, technology and the modern world in general. Mathematics is one of the most facilitating subjects and is essential to many careers and higher education opportunities as such our aim is to help students see the links between the different branches of maths and use these to strengthen their understanding of all other areas of study.
Knowledge: The subject content for AS and A-level Mathematics is set out by the Department for Education (DfE) and is common across all exam boards. The content set out in this document covers the complete AS and A-level course of study. All knowledge from the GCSE Mathematics specification is assumed
Skills: Students will be able to develop a range of mathematical skills covering the overarching themes of Mathematical argument, language and proof, Problem Solving and Modelling
Students will be able to apply this to routine questions but also able to apply them to unfamiliar, novel problems.
End Point: All students will be entered for AQA A Level Maths, with terminal exams to take place in May/June at the end of year 13. To assess progress towards this end point, pitstops follow the end of each topic. Summary assessments take place at the end of each term with an additional baseline assessment taking place before October half term reviewing content from the GCSE bridging topics in half term 1.1. End of year 12 assessments consist of a full AS paper 1 and 2. All assessments use past paper questions from AQA AS Mathematics papers during Year 12.

Year 12	Autumn Half Term				
Topics/ Skills	**Prior Learning:**	**Next Steps:**	**A Level Specification Links**	**Key Words/ Vocabulary:**	**Online Resources**
Pure Maths: Algebraic manipulation, quadratic equations and simultaneous equations	GCSE-simplifying and manipulating algebraic expressions	Rational expressions covered in Functions and Transformation	• B1 Understand and use the laws of indices for all rational exponents • B2 Use and manipulate surds, including rationalising the denominator • B3 Work with quadratic functions and their graphs; the discriminant of a quadratic function, including the conditions for real and repeated roots; completing the square; solution of quadratic equations including completing the square in a function of the unknown • B4 Solve simultaneous equations in two variables by elimination and by substitution, including one linear and one quadratic equation • B6 Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem	Indices Rational Exponent Surd Discriminant Solution Simultaneous equation Polynomial Factor theorem	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Quadratic functions Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Polynomials Maths Genie - A Level Revision - Algebraic Expressions
Pure Maths: Straight lines and circles	GCSE topics to include - linear graphs, -gradient, y=mx+c -Pythagoras' theorem -parts of circles -circle theorems		• C1 Understand and use the equation of a straight line, gradient conditions for two straight lines to be parallel or perpendicular • C1 Be able to use straight line models in a variety of contexts • C2 Understand and use the coordinate geometry of the circle including using the equation of a circle in the form ; completing the square to find the centre and radius of a circle; • C2 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	Gradient Parallel Perpendicular Coordinate geometry Intercept Chord Bisect Tangent Radius	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Coordinate geometry as-pure-equation-of-a-line.pdf as-pure-equation-of-a-circle.pdf

CARDINAL NEWMAN CATHOLIC SCHOOL

Pure Maths: Proof	GCSE- properties of number e.g primes, powers etc Algebraic manipulation including simplification and factorisation	Proof by contradiction is covered in y13	• A1 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 • A1 Disproof by counter example	Proof Disproof Axiom Assumption Deduction Exhaustion Contradiction	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Problem solving 2: Notation and proof Maths Genie - A Level Revision - Proof
Statistics: Probability and statistical distributions	Assumed knowledge: the 0 to 1 probability scale		• M1 Understand and use mutually exclusive and independent events when calculating probabilities and link to discrete and continuous distributions • N1 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	Probability Independent Mutually exclusive Discrete Continuous Expectation Discrete Random Variable (DRV)	Course: AQA Mathematics: Year 1 (AS) Statistics, Topic: Probability as-stats-probability.pdf as-stats-discrete-random-variables.pdf
Statistics: Statistical hypothesis testing		The use of correlation coefficients in hypothesis testing will be covered in year 13, Statistical hypothesis testing	• O1 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 • O2 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	See language from point O1	Course: AQA Mathematics: Year 1 (AS) Statistics, Topic: Statistical hypothesis testing as-stats-binomial-hypothesis-testing.pdf Maths Genie - A Level Revision - Sampling and Hypothesis Testing
Baseline Assessment: covers all topics from Half term 1.1					

CARDINAL NEWMAN CATHOLIC SCHOOL

Year 12	Autumn Half Term 2				
Topics/ Skills	**Prior Learning:**	**Next Steps:**	**A Level Specification links:**	**Key Words/ Vocabulary:**	**Online Resources**
Pure: Graphs, linear and quadratic inequalities	GCSE topics to include - linear graphs, -quadratic graphs, -simple cubic graphs -reciprocal graphs. -Sketching translations of a given function	-Modulus functions -Combinations of transformations will be covered in year 13, Functions and transformations	• B5 Solve linear and quadratic inequalities in a single variable and interpret such inequalities graphically, including inequalities with brackets and fractions • B5 Express solutions through correct use of 'and' and 'or', or through set notation • B5 Represent linear and quadratic inequalities such as $y>x+1$ and $y> ax^2+bx+c$ graphically • B7 Understand and use graphs of functions; sketch curves defined by simple equations including polynomials and (including their vertical and horizontal asymptotes); interpret algebraic solution of equations graphically; use intersection points of graphs to solve equations • B7 Understand and use proportional relationships and their graphs • B9 Understand the effect of simple transformations on the graph of y=f(x) including sketching associated graphs: af(x), f(x)+a, f(x+a), f(ax)	Variable Inequality Set notation Function Linear Quadratic Asymptote	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Graphs and transformations Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Equations and inequalities Maths Genie - A Level Revision - Equations and Inequalities Maths Genie - A Level Revision - Sketching Curves
Pure: Differentiation 1	the laws of indices for all rational exponents	Derivatives of trig, exponential and logarithmic functions and the connection of the second derivative to convex and concave sections of curves and points of inflection will be covered in year 13, Further differentiation	• G1 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 • G1 Understand and use the second derivative as the rate of change of gradient	Derivative Differentiate Rate of change Gradient Maxima Minima Stationary Increasing decreasing	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Differentiation Maths Genie - A Level Revision - Differentiation as-pure-differentiation-first-principles.pdf as-pure-differentiation.pdf

CARDINAL NEWMAN CATHOLIC SCHOOL

Pure: Integration	the laws of indices for all rational exponents	•The integrals of e^kx, 1/x , sin kx and cos kx. The area bounded by two curves will be covered in year 13, Further integration	• H1 Know and use the Fundamental Theorem of Calculus • H2 Integrate x^n (excluding n=-1) , and related sums, differences and constant multiples • H3 Evaluate definite integrals; use a definite integral to find the area under a curve	Integral Definite integral Constant of integration Fundamental Theorem of Calculus Evaluate	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Integration Maths Genie - A Level Revision - Integration
Pure: Exponentials and logarithms	the laws of indices for all rational exponents		• F1Know and use the function e^x and its graph, where is x positive • F1 Know and use the function e^x and its graph • F2 Know the gradient of e^x hence understand why the exponential model is suitable in many applications • F3 Know and use the definition of $\log_a x$ as the inverse of a^x , where a is positive and x≥0 • F3 Know and use the function ln x and its graph • F3 Know and use ln x as the inverse function of e^x • F4 Understand and use the laws of logarithms: loga x+loga y=loga(xy) ; loga x-loga y=loga (x/y) ; k loga x=loga x^k (including, for example k=-1 and k=-1/2) • F5 Solve equations of the form a^x=b • F6 Use logarithmic graphs to estimate parameters in relationships of the form y=ax^n and y=kb^x, given data for x and y • F7 Understand and use exponential growth and decay; use in modelling (examples may include the use of e 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	Exponential Logarithmic Log Natural Log Growth Decay Parameter Model	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Exponentials and logarithms Maths Genie - A Level Revision - Exponentials and Logarithms as-pure-exponentials-and-logs.pdf
Autumn Assessment: covers topics from 1.1 and 1.2					

CARDINAL NEWMAN CATHOLIC SCHOOL

Year 12	Spring Term				
Topics/ Skills	**Prior Learning:**	**Next Steps:**	**A Level Specification links:**	**Key Words/ Vocabulary:**	**Online Resources**
Pure: Trigonometry	•Assumed knowledge: sine, cosine and tangent as the ratios of sides of a right-angled triangle	Small angle approximation Calculus with trig ratios and identities Exact Values Radians Secant Cosecant Cotangent	• E1 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 1/2 ab sin C • E3 Understand and use the sine, cosine and tangent functions; their graphs, symmetries and periodicity • E5 Understand and use $\tan\theta=\sin\theta/\cos\theta$ • E5 Understand and use $\sin^2\theta + \cos^2\theta = 1$ • E7 Solve simple trigonometric equations in a given interval, including quadratic equations in sin, cos and tan and equations involving multiples of the unknown angle	Sine Cosine Tangent SOHCAHTOA Inverse Function CAST diagram	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Trigonometry Maths Genie - A Level Revision - Trigonometry as-pure-sine-cosine-area.pdf
Pure: Binomial expansions		Any rational values of n including negatives	• D1 Understand and use the binomial expansion for positive integer; the notations n! And nCr; link to binomial probabilities	Factorial Binomial Rational Coefficient Expansion	as-pure-binomial-expansion.pdf Course: AQA Mathematics: Year 1 (AS) Pure, Topic: The binomial expansion
Pure: Vectors	GCSE- Vector Notation Pythagoras Theorem Basic Trigonometry	Vectors in three dimensions and the use of vectors in kinematics problems will be covered in year 13, Kinematics in two dimensions	• J1Use vectors in two dimensions • J2 Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form • J3 Add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars, and understand their geometrical interpretations • J4 Understand and use position vectors; calculate the distance between two points represented by position vectors • J5 Use vectors to solve problems in pure mathematics and in context, including forces	Vector Scalar Magnitude Direction Component form Position Vector Unit vector	Course: AQA Mathematics: Year 1 (AS) Pure, Topic: Vectors Maths Genie - A Level Revision - 2D Vectors as-pure-vectors.pdf

CARDINAL NEWMAN CATHOLIC SCHOOL

Stats: Statistical sampling	Assumed knowledge: application of basic statistics to describe a population		•K1 Understand and use the terms 'population' and 'sample' •K1 Use samples to make informal inferences about the population •K1 Understand and use sampling techniques, including simple random sampling and opportunity sampling •K1 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	Population Sample Random Opportunity Bias	Course: AQA Mathematics: Year 1 (AS) Statistics, Topic: Data toolkit as-stats-sampling.pdf
Stats: Data presentation and interpretation	•Assumed knowledge: recognise correlation and know that it does not indicate causation. •quartiles and inter-quartile range		•L1 Interpret diagrams for single-variable data, including understanding that area in a histogram represents frequency •Connect to probability distributions •L2 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) •L2 Understand informal interpretation of correlation •L2 Understand that correlation does not imply causation •L3 Interpret measures of central tendency and variation, extending to standard deviation •L3 Be able to calculate standard deviation, including from summary statistics •L4 Recognise and interpret possible outliers in data sets and statistical diagrams •L4 Select or critique data presentation techniques in the context of a statistical problem •L4 Be able to clean data, including dealing with missing data, errors and outliers	Distribution Single-variable Histogram Scatter diagram Regression Correlation Causation Measure of central tendency Standard deviation Variance Outlier	Course: AQA Mathematics: Year 1 (AS) Statistics, Topic: Collecting and interpreting data Maths Genie - A Level Revision - Data Presentation and Representation
Mechanics: Kinematics in one dimension	General understanding of units and conversion between metric units. GCSE Compound Measures- Speed Basic Calculus from AS- differentiation	Moments. The extension to two dimensions and to use calculus techniques for motion in two dimensions using vectors will be covered in year 13, Kinematics in two dimensions.	• P1 Understand and use fundamental quantities and units in the S.I. system: length, time, mass • P1 Understand and use derived quantities and units: velocity, acceleration, force, weight • Q1 Understand and use the language of kinematics: position; displacement; distance travelled; velocity; speed; acceleration • Q2 Understand, use and interpret graphs in kinematics for motion in a straight line: displacement against time and interpretation of gradient; velocity against time and interpretation of gradient and area under the graph	See units of measure in P1 See language of kinematics in Q1 Derive Kinematics SI Force Acceleration Uniform Displacement	Maths Genie - A Level Revision - Kinematics Course: AQA Mathematics: Year 1 (AS) Mechanics, Topic: Kinematics

CARDINAL NEWMAN CATHOLIC SCHOOL

	and integration of polynomials.		• Q3 Understand, use and derive the formulae for constant acceleration for motion in a straight line • Q4 Use calculus in kinematics for motion in a straight line: v=dr/dt , a=dv/dt=d^2 r/dt^2 , r=∫v dt , v=∫a dt		
Spring Assessment: Covers all topics so far, with increased focus on Spring Term					
Year 12	**Summer Term**				
Topics/ Skills	**Prior Learning:**	**Next Steps:**	**A Level Specification links:**	**Key Words/ Vocabulary:**	**Online Resources**
Mechanics: Forces and Newton's laws		extension to situations where forces need to be resolved in two dimensions will be covered in year 13, Equilibrium and resolving. Resolving forces in two dimensions and the equilibrium of a particle under coplanar forces will be covered in year 13, Equilibrium and resolving	• R1 Understand the concept of a force; understand and use Newton's first law • R2 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) • R3Understand 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) • R4 Understand and use Newton's third law; equilibrium of forces on a particle and motion in a straight line (restricted to forces in two perpendicular directions or simple cases of forces given as 2-D vectors); application to problems involving smooth pulleys and connected particles	Force Equilibrium Weight Mass Gravity g=9.8 Particle Smooth Rough Connected Tension Inextensible Negligible Resistance	Course: AQA Mathematics: Year 1 (AS) Mechanics, Topic: Forces and Newton's laws Maths Genie - A Level Revision - Forces as-mechanics-f-m-a.pdf as-mechanics-2d-vectors.pdf
Pure: Binomial theorem, sequences and series (A2)	Y12 Binomial expansions		• D1 Extend the binomial theorem to any rational n , including its use for approximation; be aware that the expansion is valid for $\|bx/a\|<1$. (proof not required) • D2 Work with sequences including those given by a formula for the nth term and those generated by a simple relation of the form $xn+1= f(xn)$; increasing sequences; decreasing sequences; periodic sequences • D3 Understand and use sigma notation for sums of series • D4 Understand and work with arithmetic sequences and series, including the formulae for nth term and the sum to n terms	Binomial Rational Increasing Decreasing Periodic Sigma notation Sum Series Arithmetic Geometric Sum to Infinity	Course: AQA Mathematics: Year 2 Pure, Topic: Sequences and series Maths Genie - A Level Revision - Sequences and Series

			• D5 Understand and work with geometric sequences and series including the formulae for the nth term and the sum of a finite geometric series; the sum to infinity of a convergent geometric series, including the use of $\|r\|<1$; modulus notation • D6 Use sequences and series in modelling	Finite Convergent Divergent	
Summer Assessment: 2 x AS papers. Full revision process including practice papers and targeted review of weaker topics					

CARDINAL NEWMAN CATHOLIC SCHOOL

Cardinal Newman School: Medium Term Plan Maths Year 13

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Skills: Students will be able to develop a range of mathematical skills covering the overarching themes of Mathematical argument, language and proof, Problem Solving and Modelling Students will be able to apply this to routine questions but also able to apply them to unfamiliar, novel problems.
End Point: All students will be entered for AQA A Level Maths, with terminal exams to take place in May/June at the end of year 13. To assess progress towards this end point, Mock exams take place once per half term with an additional baseline assessment taking place in the first week of September to review year 12 content. All assessments use past paper questions from past AQA A Level Mathematics papers.

Year 13	Autumn Half Term 1				
Topics/Skills	**Prior Learning:**	**Next Steps:**	**A Level Specification Links:**	**Key Words/ Vocabulary:**	**Online Resources**
Baseline Assessment: covers Sequence and Series A2 from Summer year 12 + topics which require improvement from year 12					
Pure: Functions and transformation	Assumed knowledge: covered in year12, Algebraic manipulation, quadratic equations and simultaneous equations, year 12, Graphs, linear and quadratic inequalities		• B6 Simplify rational expressions including by factorising and cancelling, and algebraic division (by linear expressions only) • B7 The modulus of a linear function • B8 Understand and use composite functions; inverse functions and their graphs • B9 Combinations of transformations (translations and stretches)	Factorise Modulus Function Composite Inverse Transform	Maths Genie - A Level Revision - Functions Course: AQA Mathematics: Year 2 Pure, Topic: Functions
Pure: Trigonometry and circular measure	Assumed knowledge: covered in year 12, Trigonometry		• E1 Work with radian measure, including use for arc length and area of sector • E2 Understand and use the standard small angle approximations of sine, cosine and tangent where θ is in radians • E3 Know and use exact values of sin and cos for 0 , π/6 , π/4 , π/3 , π/2 , π and multiples thereof, and exact values of tan for 0 , π/6 , π/4 , π/3 , π and multiples thereof • E4 Understand and use the definitions of secant, cosecant and cotangent and of arcsin, arccos and arctan; their relationships to sine, cosine and tangent; • E5 Understand and use $\sec 2\theta = 1 + \tan 2\theta$ and $\operatorname{cosec} 2\theta = 1 + \cot 2\theta$	Radian Identity Approximation Secant Cosecant Cotangent $\sin\theta \approx \theta$, $\cos\theta \approx (1-\theta^2)/2$, $\tan\theta \approx \theta$	Course: AQA Mathematics: Year 2 Pure, Topic: Trigonometry Maths Genie - A Level Revision - Trigonometry a-pure-radians.pdf a-pure-small-angle-approximations.pdf

CARDINAL NEWMAN CATHOLIC SCHOOL

Statistics: Statistical distributions 2	AS **Probability and statistical distributions**		• N2 Understand and use the Normal distribution as a model; find probabilities using the Normal distribution • N2 Link to histograms, mean, standard deviation, points of inflection and the binomial distribution • N3 Select an appropriate probability distribution for a context, with appropriate reasoning, including recognising when the binomial or Normal model may not be appropriate	Normal distribution Histogram Standard deviation Binomial model	Course: AQA Mathematics: Year 2 Statistics, Topic: Statistical distributions Maths Genie - A Level Revision - Statistical Distributions
Stats: Statistical hypothesis testing	AS **Statistical hypothesis testing**		• O1 Understand and apply correlation coefficients as measures of how close data points lie to a straight line and be able to interpret a given correlation coefficient using a given p-value or critical value (calculation of correlation coefficients is excluded) • O3 Conduct a statistical hypothesis test for the mean of a Normal distribution with known, given or assumed variance and interpret the results in context	Correlation p-value critical value statistical normal distribution mean	Course: AQA Mathematics: Year 2 Statistics, Topic: Statistical hypothesis testing Maths Genie - A Level Revision - Hypothesis Testing
Stats: Further probability	AS **Probability and statistical distributions**		• M2 Understand and use conditional probability, including the use of tree diagrams, Venn diagrams, two-way tables • M2 Understand and use the conditional probability formula $\mathrm{P}(A\|B) = \frac{\mathrm{P}(A \cap B)}{\mathrm{P}(B)}$ • M3 Modelling with probability, including critiquing assumptions made and the likely effect of more realistic assumptions	Conditional Venn Assumption Given And/or	Course: AQA Mathematics: Year 2 Statistics, Topic: Probability Maths Genie - A Level Revision - Probability
Mock Exams 1					
Year 13	**Autumn Half Term 2**				

CARDINAL NEWMAN CATHOLIC SCHOOL

Topics/ Skills	Prior Learning:	Next Steps:	A Level Specification Links:	Key Words/ Vocabulary:	Online Resources
Pure: Further differentiation	Assumed knowledge: covered in year 12, Differentiation		• G1 Understand and use the derivative of sin$x$ and cos$x$ • G1 The second derivative and its connection to convex and concave sections of curves and points of inflection • G2 Differentiate ekx and akx , sinkx , coskx , tankx and related sums, differences and constant multiples • G2 Understand and use the derivative of ln$x$ • G3 Apply differentiation to find points of inflection • G4 Differentiate using the product rule, the quotient rule and the chain rule, including problems involving connected rates of change and inverse functions	Derivative Second derivative Convex Concave Point of inflection Product Quotient Rate of change Chain rule	Course: AQA Mathematics: Year 2 Pure, Topic: Differentiation Course: AQA Mathematics: Year 2 Pure, Topic: Further differentiation Maths Genie - A Level Revision - Differentiation
Pure: Further integration	Assumed knowledge: covered in year 12, Integration		• H2 Integrate ekx , 1/x , sinkx , coskx and related sums, differences and constant multiples • H3 Use a definite integral to find the area between two curves • H4 Understand and use integration as the limit of a sum • H5 Carry out simple cases of integration by substitution and integration by parts; understand these methods as the inverse processes of the chain and product rules respectively	Integration Definite integral Substitution By parts Inverse Constant of integration	Course: AQA Mathematics: Year 2 Pure, Topic: Integration Maths Genie - A Level Revision - Integration
Pure: Partial fractions and integration	Assumed knowledge: covered in year 12, Integration and y13 Further Integration Assumed Knowledge: Algebraic manipulation, quadratic equations and simultaneous equations		• B10 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) • H6 Integrate using partial fractions that are linear in the denominator	Rational Partial fraction Numerator Denominator Integrate	Course: AQA Mathematics: Year 2 Pure, Topic: Algebra 3: Partial fractions Maths Genie - A Level Revision - Partial Fractions
Pure: Trigonometry	Assumed knowledge: covered in year 12, Trigonometry		• E6 Understand and use double angle formulae; use of formulae for $sin\,(A \pm B)$, $cos\,(A \pm B)$ and $tan\,(A \pm B)$; understand geometrical proofs of these formulae • E6 Understand and use expressions for $a\cos\theta + b\sin\theta$ in the equivalent forms of $r\cos(\theta \pm \alpha)$ or $r\sin(\theta \pm \alpha)$ • E8 Construct proofs involving trigonometric functions and identities	Formula listed to left Proof Function identity	Maths Genie - A Level Revision - Trigonometry

CARDINAL NEWMAN CATHOLIC SCHOOL

Christmas Revision for January Mocks					
Year 13	**Spring Half Term 1**				
Topics/ Skills	**Prior Learning:**	**Next Steps:**	**A Level Specification links:**	**Key Words/ Vocabulary:**	**Online Resources**
January Mocks					
Pure: Numerical methods	GCSE content Solving linear and quadratic equations both algebraically and graphically Area of a trapezium Substitution AS content- Integration		• I1 Locate roots of $f(x)= 0$ by considering changes of sign of $f(x)$ in an interval of x on which $f(x)$ is sufficiently well-behaved • I1 Understand how change of sign methods can fail • I2 Solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams • I2 Solve equations using the Newton-Raphson method and other recurrence relations of the form $xn+1 = g(xn)$ • I2 Understand how such methods can fail • I3 Understand and use numerical integration of functions, including the use of the trapezium rule and estimating the approximate area under a curve and limits that it must lie between • I4 Use numerical methods to solve problems in context	Interval Roots Sign change Approximate Iterative Cobweb Staircase Newton-Raphson Recurrence Trapezium rule	Course: AQA Mathematics: Year 2 Pure, Topic: Numerical methods
Pure: Parametric equations			• C3 Understand and use the parametric equations of curves and conversion between Cartesian and parametric forms • C4 Use parametric equations in modelling in a variety of contexts • G5 Differentiate simple functions and relations defined implicitly or parametrically, for first derivative only	Parametric Cartesian Implicit derivative	Course: AQA Mathematics: Year 2 Pure, Topic: Parametric equations Maths Genie - A Level Revision - Parametric Equations a-pure-integration-parametric.pdf

CARDINAL NEWMAN CATHOLIC SCHOOL

Pure: Differential equations			• B11 Use of functions in modelling, including consideration of limitations and refinements of the models • G5 Differentiate simple functions and relations defined implicitly, for first derivative only • G6 Construct simple differential equations in pure mathematics and in context, (contexts may include kinematics, population growth and modelling the relationship between price and demand) • H7 Evaluate the analytical solution of simple first order differential equations with separable variables, including finding particular solutions (Separation of variables may require factorisation involving a common factor) • H8 Interpret the solution of a differential equation in the context of solving a problem, including identifying limitations of the solution; includes links to kinematics	Function Implicit Derivative Differential equation First order Variable	Course: AQA Mathematics: Year 2 Pure, Topic: Differential equations a-pure-differential-equations.pdf
Pure: Proof 2	AS Proof		• A1 Proof by contradiction (including proof of the irrationality of and the infinity of primes, and application to unfamiliar proofs)	Proof Disproof Axiom Assumption Deduction Exhaustion Contradiction	Course: AQA Mathematics: Year 2 Pure, Topic: Proof a-pure-proof-by-contradiction.pdf
Mechanics: Kinematics in two dimensions	Assumed knowledge: covered in year 12, Vectors and year 12, Kinematics in one dimension		• J1 Use vectors in three dimensions • J5 Use vectors to solve problems in kinematics • E9 Use trigonometric functions to solve problems in context, including problems involving vectors, kinematics and forces • Q3 Understand, use and derive the formulae for constant acceleration for motion in 2 dimensions using vectors • Q4 Use calculus in kinematics for motion in 2 dimensions using vectors • Q5 Model motion under gravity in a vertical plane using vectors; projectiles	Vector Scalar Magnitude Direction Component form Position Vector Unit vector SUVAT Kinematics Projectile Gravity	Course: AQA Mathematics: Year 2 Mechanics, Topic: Kinematics Course: AQA Mathematics: Year 2 Mechanics, Topic: Projectiles Maths Genie - A Level Revision - Kinematics
Spring Mocks					
Year 13	**Spring Half Term 2**				

CARDINAL NEWMAN CATHOLIC SCHOOL

Topics/ Skills	Prior Learning:	Next Steps:	A Level Specification links:	Key Words/ Vocabulary:	Online Resources
Mechanics: Equilibrium and resolving	Assumed knowledge: covered in year 12, Forces and Newton's laws		• R2 Understand and use Newton's second law for motion in situations where forces need to be resolved (restricted to 2 dimensions) • R4 Resolving forces in 2 dimensions; equilibrium of a particle under coplanar forces	Resolve Equilibrium Coplanar Newton's Laws	Course: AQA Mathematics: Year 2 Mechanics, Topic: Forces and motion Maths Genie - A Level Revision - Forces
Mechanics: Statics and dynamics	Assumed knowledge: covered in year 12, Forces and Newton's laws		• R5 Understand and use addition of forces; resultant forces; dynamics for motion in a plane • R9 Understand and use the $F \leq \mu R$ model for friction; coefficient of friction; motion of a body on a rough surface; limiting friction and statics	Coefficient of friction Resultant Resistance Rough Limiting friction statics	Course: AQA Mathematics: Year 2 Mechanics, Topic: A model for friction
Mechancis: Moments	Assumed knowledge: covered in year 12, Kinematics in one dimension		• P1 Understand and use derived quantities and units: moment • S1 Understand and use moments in simple static contexts	Moments Derive Kinematics SI Force Acceleration Uniform Displacement	Course: AQA Mathematics: Year 2 Mechanics, Topic: Moments of forces Maths Genie - A Level Revision - Moments
Year 13	**Summer Term**				
Revision and Exams- See "Final Countdown" Plan	Remaining lessons to consist of targeted revision and past exam paper practice.				