



MAGHULL HIGH SCHOOL – CURRICULUM MAP Year 13 Half Term 4

Unit:	Week 1 -2	Week 3-4	Week 5-6	
LESSON TOPIC QUESTION(S)	<p>Working Through Past Exam Questions for Revision Paying attention to:</p> <ul style="list-style-type: none"> • Algebra & Functions – review equations, inequalities, and graphs • Integration – standard forms, substitution, area under curves • Statistical Sampling – methods, bias, data presentation • Discrete Random Variables – expectation, variance <ul style="list-style-type: none"> • Using trig identities • Curve sketching • Points of intersection • Locating roots • Iteration • The Newton Raphson method • Applications to modelling • Integrating standard functions • Integrating $f(ax+b)$ • Using trig identities • Trapezium rule 	<p>Working Through Past Exam Questions for Revision Paying attention to</p> <ul style="list-style-type: none"> • Coordinate Geometry – circles, straight lines, tangents • Exponentials & Logarithms – laws, solving equations • Measures of location & spread – mean, median, IQR, variance • Normal Distribution – z-scores, probability areas <ul style="list-style-type: none"> • Product rule • Quotient rule • Differentiating trig functions • Parametric differentiation • Implicit differentiation • Using second derivatives • Rates of change • Reverse chain rule • Integration by substitution • Integration by parts • Partial fractions • Finding area 	<p>Working Through Past Exam Questions for Revision Paying attention to</p> <ul style="list-style-type: none"> • Differentiation – first & second derivatives, applications • Trigonometry – identities, equations, small-angle approximations • Probability – Venn diagrams, conditional probability • Hypothesis Testing – interpreting p-values <ul style="list-style-type: none"> • Small angle approximations • Secant, cosecant, cotangent • Graphs of trig functions • Using sec, cosec and cot • Trig identities • Inverse trig functions • Addition formulae • Using angle addition formulae • Double angle formulae • Solving trig equations 	
Knowledge & Skills development	Topic	Skills Developed	Prior Knowledge	Next Steps / Future Learning
	Algebraic fractions	Simplifying, adding, subtracting, multiplying, and dividing algebraic fractions with linear and quadratic denominators.	Simplifying numerical fractions, expanding and factorising algebraic expressions.	Rational expressions and partial fractions (A Level).
	Dividing polynomials	Performing long and synthetic division of polynomials; understanding remainders.	Expanding brackets, factorising quadratics, and understanding powers.	Polynomial division for algebraic fractions and roots of equations (A Level).

	Factor theorem	Using the factor theorem to test and find roots of polynomials.	Substitution, expanding and factorising cubic expressions.	Linking factors and roots to graph intercepts; using remainder theorem (A Level).
	Proof	Constructing logical arguments, including algebraic and geometric proofs.	Algebraic manipulation, basic properties of shapes, logical reasoning.	Formal proofs
Assessment / Feedback Opportunities	<ul style="list-style-type: none"> • Weekly diagnostic checks on key concepts such as exact values, differentiation, and function composition • Use of mini whiteboards and retrieval starters to identify misconceptions • Mid-unit formal assessment focusing on methods • Self and peer assessment of written mathematical justifications • Targeted feedback after extended answer practice and modelling of exemplar responses • Application of exam-style tasks for differentiated feedback and follow-up interventions 			
Key Vocabulary	<p>Algebra, equation, inequality, graph, function, domain, range, roots, intercepts, quadratic, cubic, transformation, factorisation, substitution, rearranging, completing the square, simultaneous equations, modulus, exponential, logarithm, laws of logarithms, natural log, base, solving equations, indices, power, inverse function</p> <p>Integration, integrand, integral, antiderivative, definite integral, indefinite integral, limits, constant of integration, area under a curve, substitution, change of variable, reverse chain rule, integration by parts, partial fractions, standard forms, integrating $f(ax + b)$, trapezium rule, numerical integration, approximation, error, estimation</p> <p>Differentiation, derivative, first derivative, second derivative, gradient, tangent, normal, stationary point, maximum, minimum, inflection point, rates of change, product rule, quotient rule, chain rule, parametric differentiation, implicit differentiation, second derivatives, curvature, optimisation, modelling</p> <p>Trigonometry, sine, cosine, tangent, secant, cosecant, cotangent, reciprocal trig functions, radians, degrees, trig equations, trig identities, double angle formulae, addition formulae, subtraction formulae, small angle approximations, inverse trig functions, arcsin, arccos, arctan, unit circle, amplitude, period, phase shift, graph transformation</p> <p>Iteration, iterative formula, convergence, divergence, fixed point, numerical method, approximation, tolerance, Newton-Raphson method, tangent method, error bound, root finding, locating roots, sign change method, convergence criteria</p> <p>Curve sketching, coordinates, intercepts, asymptotes, turning points, stationary points, symmetry, domain, range, concavity, point of inflection, transformations, reflections, translations, scaling</p> <p>Coordinate geometry, straight line, gradient, midpoint, distance, equation of a line, circle, radius, centre, tangent, normal, perpendicular, intersection points, simultaneous equations, geometry, vector form</p> <p>Statistical sampling, population, sample, bias, random sampling, stratified sampling, systematic sampling, opportunity sampling, quota sampling, data presentation, frequency, histogram, cumulative frequency, box plot, outlier</p> <p>Discrete random variables, probability, distribution, probability mass function, expectation, mean, variance, standard deviation, outcomes, events, sample space</p> <p>Measures of location, mean, median, mode, quartiles, interquartile range (IQR), range, variance, standard deviation, measure of spread, dispersion, skewness</p> <p>Normal distribution, z-score, standard normal, probability density function, mean, standard deviation, probability area, cumulative probability, standardisation, normal approximation</p> <p>Probability, independent events, mutually exclusive, conditional probability, sample space, Venn diagram, intersection, union, complement, addition rule, multiplication rule</p>			

	<p>Hypothesis testing, null hypothesis, alternative hypothesis, significance level, p-value, critical region, test statistic, acceptance region, conclusion, interpretation</p> <p>Applications to modelling, mathematical model, assumptions, simplification, refinement, real-world data, validation, prediction, limitation, variable relationships</p>
Literacy/Reading opportunities	<ul style="list-style-type: none"> • Structured writing tasks to explain transformations and derivatives • Sentence stems to support justification of domain/range decisions • Reading and evaluating modelled responses to extended problems • Glossary-building of complex mathematical terms through application • Deconstructing multi-step calculus and trigonometric word problems
Cross Curricular Themes	<p>Physics – Applications of trigonometric and logarithmic functions in wave modelling and decay problems</p> <p>Economics – Rate of change concepts in cost/revenue modelling</p> <p>Computing – Algorithmic thinking and function design</p> <p>Engineering – Application of differentiation in design and structural analysis</p> <p>PE & Biology – Use of trigonometric and exponential models in biomechanics and growth analysis</p>
Personal Development (Including British Values, RSE, Citizenship)	<ul style="list-style-type: none"> • Promote resilience when dealing with unfamiliar multi-step calculus and algebra tasks • Encourage critical thinking and independence in applying abstract methods to real-world problems • Reinforce precision and accuracy as valuable traits in analytical reasoning • Support confident communication of reasoning through structured discussions and peer explanation • Develop a growth mindset by embracing challenge and mathematical ambiguity
Career Opportunities	<ul style="list-style-type: none"> • Provides foundation for STEM careers in engineering, data science, physics, computing, and economics • Trigonometric modelling, calculus, and algebra relevant for architecture, actuarial science, and medicine • Encourages problem-solving and logical reasoning essential in law, finance, and technology sectors