



Year 13 Pure Maths Learning Journey

Curriculum Journey – Y13 Pure Mathematics

When?	Chapter	Key Learning Objectives Key Questions	Unit Assessments
HALF TERM 1	1. Algebraic methods	<ul style="list-style-type: none"> ● Use proof by contradiction to prove true statements ● Multiply and divide two or more algebraic fractions ● Add or subtract two or more algebraic fractions ● Convert an expression with linear factors in the denominator into partial fractions ● Convert an expression with repeated linear factors in the denominator into partial fractions ● Divide algebraic expressions ● Convert an improper fraction into partial fraction form 	EOC Test 1 covering <ul style="list-style-type: none"> ● proof by contradiction ● add, subtract, times, divide algebraic fractions ● partial fractions with linear factors, repeated factors in denominator ● algebraic long division ● improper fractions
	2. Functions and graphs	<ul style="list-style-type: none"> ● Understand and use the modulus function ● Understand mappings and functions, and use domain and range ● combine two or more functions to make a composite function ● know how to find the inverse of a function graphically and algebraically ● Sketch the graphs of the modulus function $y = f(x)$ and $y = f(x)$ ● Apply a combination of two (or more) transformations to the same curve ● Transform the modulus function 	EOC Test 2 covering <ul style="list-style-type: none"> ● modulus function ● mappings and functions ● domain and range ● composite function ● inverse of a function ● graphs of the modulus function $y = f(x)$ and $y = f(x)$ ● two (or more) transformations to the same curve

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	3. Sequences and series	<ul style="list-style-type: none"> ● Find the nth term of an arithmetic sequence ● Prove and use the formula for the sum of the first n terms of an arithmetic series ● Find the nth term of a geometric sequence ● Prove and use the formula for the sum of a finite geometric series ● Prove and use the formula for the sum to infinity of a convergent geometric series ● Use sigma notation to describe series ● Generate sequences from recurrence relations ● Model real-life situations with sequences and series 	EOC Test 3 covering <ul style="list-style-type: none"> ● N-th term of an arithmetic and geometric ● S_n ● Sum to infinity ● sigma notation ● recurrence relations ● Model
HALF TERM 2	4. Binomial expansion	<ul style="list-style-type: none"> ● Expand $(1 + x)^n$ for any rational constant n and determine the range of values of x for which the expression is valid ● Expand $(a + bx)^n$ for any rational constant n and determine the range of values of x for which the expression is valid ● Use partial fractions to expand fractional expressions 	EOC Test 4 covering <ul style="list-style-type: none"> ● $(1 + x)^n$ ● $(a + bx)^n$ ● Use partial fractions
	5. Radians	<ul style="list-style-type: none"> ● Convert between degrees and radians and apply this to trigonometric graphs and their transformations ● Know exact values of angles measured in radians ● Find an arc length using radians ● Find areas of sectors and segments using radians ● Solve trigonometric equations in radians ● Use approximate trigonometric values when θ is small 	EOC Test 5 covering <ul style="list-style-type: none"> ● Use radians, with trig graphs and their transformations ● Exact values eg $30 = \frac{\pi}{6}$ ● Arc length ● Sector area ● Solve trig equations with radians ● Trig approximations when θ is small
	6. Trigonometric functions	<ul style="list-style-type: none"> ● Understand the definition of secant, cosecant and cotangent and their relationship to cosine, sine and tangent ● Understand the graphs of secant, cosecant and cotangent and their domain and range ● Simplify expressions, prove simple identities and solve equations involving secant, cosecant and cotangent ● Prove and use $\sec^2 x \equiv 1 + \tan^2 x$ and $\operatorname{cosec}^2 x \equiv 1 + \cot^2 x$ ● understand and use inverse trigonometric functions 	EOC Test 6 covering <ul style="list-style-type: none"> ● Use sec, cosec, cot, and their graphs ● Prove identities with sec, cosec, cot ● Prove and use $\sec^2 x \equiv 1 + \tan^2 x$ and $\operatorname{cosec}^2 x \equiv 1 + \cot^2 x$ ● inverse trigonometric functions and their domain and ranges

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		and their domain and ranges	
	7. Trigonometry and modelling	<ul style="list-style-type: none"> ● Prove and use the addition formulae ● understand and use the double-angle formulae ● Solve trigonometric equations using the double-angle and addition formulae ● Write expressions of the form $a \cos \theta \pm b \sin \theta$ in the form $R \cos(\theta \pm a)$ or $R \sin(\theta \pm a)$ ● Prove trigonometric identities using a variety of identities ● Use trigonometric functions to model real-life situations 	EOC Test 7 covering <ul style="list-style-type: none"> ● addition formulae ● double-angle formulae ● Solve trigonometric equations using the double-angle and addition formulae ● $R \cos(\theta \pm a)$, $R \sin(\theta \pm a)$ ● Prove trigonometric identities ● Use trigonometric functions to model real-life situations
HALF TERM 3	8. Parametric equations	<ul style="list-style-type: none"> ● Convert parametric equations into Cartesian form by substitution ● Convert parametric equations into Cartesian form using trigonometric identities ● Understand and use parametric equations of curves and sketch parametric curves ● Solve coordinate geometry problems involving parametric equations ● Use parametric equations in modelling in a variety of contexts 	EOC Test 8 covering <ul style="list-style-type: none"> ● parametric equations into Cartesian ● parametric equations into Cartesian form using trigonometric identities ● use parametric equations of curves ● sketch parametric curves ● Solve coordinate geometry problems ● modelling
	9. Differentiation	<ul style="list-style-type: none"> ● Differentiate trigonometric functions ● Differentiate exponentials and logarithms ● Differentiate functions using the chain, product and quotient rules ● Differentiate parametric equations ● Differentiate functions which are defined implicitly ● Use the second derivative to describe the behaviour of a function ● Solve problems involving connected rates of change 	EOC Test 9 covering Differentiation of/using <ul style="list-style-type: none"> ● trigonometric functions ● exponentials and logarithms ● using the chain, product and quotient rules ● parametric equations ● implicit ● second derivative connected rates of change differential equations

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		and construct simple differential equations	
HALF TERM 4	10. Numerical methods	<ul style="list-style-type: none"> ● Locate roots of $f(x) = 0$ by considering changes of sign ● Use iteration to find an approximation to the root of the equation $f(x) = 0$ ● Use the Newton-Raphson procedure to find approximations of the solutions of equations in the form $f(x) = 0$ ● Use numerical methods to solve problems in context 	EOC Test 10 covering <ul style="list-style-type: none"> ● Locate roots ● Iteration ● Newton Raphson ● Numerical methods ●
	11. Integration	<ul style="list-style-type: none"> ● Integrate standard mathematical functions including trigonometric and exponential functions and use the reverse of the chain rule to integrate functions in the form of $f(ax + b)$ ● Use trigonometric identities in integration ● Use the reverse of the chain rule to integrate more complex functions ● Integrate functions by making a substitution, using integration by parts and using partial fractions ● Use integration to find the area under a curve ● Use the trapezium rule to approximate the area under a curve ● Solve simple differential equations and model real-life situations with differential equations 	EOC Test 11 covering Integrate: <ul style="list-style-type: none"> ● Trig functions ● Exponentials ● Using reverse chain rule ● Using trig identities ● By substitution ● By parts ● Using partial fractions ● To find area under a curve Trapezium rule Solve differential equations, and model

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	12. Vectors	<ul style="list-style-type: none"> ● Understand 3D Cartesian coordinates ● Use vectors in three dimensions ● Use vectors to solve geometric problems ● Model 3D motion in mechanics with vectors 	EOC Test 12 covering <ul style="list-style-type: none"> ● 3D coordinates ● Vectors in 3D ● Solve problems with vectors ● 3D motion