

Year 13 PURE Mathematics Key Stage 5 Maths Curriculum

Autumn 1	
Pure Chapter 6: Trigonometric functions	Pure Chapter 7: Trigonometry and modelling
Assessment: Chapter assessment 6 Trigonometric functions	Assessment: Chapter assessment 7 Trigonometry and modelling
Builds Upon (GCSE (9-1) in Mathematics at Higher Tier): <ul style="list-style-type: none"> • Sine and cosine function • Length of arc and area of sector 	Builds Upon (GCSE (9-1) in Mathematics at Higher Tier): <ul style="list-style-type: none"> • Sine and cosine function • Length of arc and area of sector
Builds Upon (AS Mathematics - Pure Mathematics content): <ul style="list-style-type: none"> • Algebraic division, factor theorem • Solving trigonometric equations • $\sin 2x + \cos 2x = 1$ and $\sin x \cos x = \tan x$ • Properties of graphs of $y = \sin x, y = \cos x$ and $y = \tan x$ 	Builds Upon (AS Mathematics - Pure Mathematics content): <ul style="list-style-type: none"> • Algebraic division, factor theorem • Solving trigonometric equations • $\sin 2x + \cos 2x = 1$ and $\sin x \cos x = \tan x$ • Properties of graphs of $y = \sin x, y = \cos x$ and $y = \tan x$
Introduces: <ul style="list-style-type: none"> • Understand the definitions 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 $\sec 2x = 1 + \tan^2 x$ and $\operatorname{cosec} 2x = 1 + \cot^2 x$ • Understand and use inverse trigonometric functions and their domain and ranges. 	Introduces: <ul style="list-style-type: none"> • Prove and use the addition formulae • Use the angles addition formulae • Understand and use the double-angle formulae • Solve trigonometric equations using the double-angle and addition formulae • Write and simplify expressions of the form $a \cos \theta + b \sin \theta$ in forms $R \cos(\theta + \alpha)$ or $R \sin(\theta + \alpha)$ • Prove trigonometric identities using a variety of identities • Use trigonometric functions to model real-life situations
Pure Chapter 9: Differentiation	
Assessment: Chapter assessment 9 Differentiation	
Builds Upon (GCSE (9-1) in Mathematics at Higher Tier): <ul style="list-style-type: none"> • Coordinate geometry • Changing the subject of the formula, and substitution • Graphs of linear, quadratic and trigonometric functions 	

Builds Upon AS Mathematics - Pure Mathematics content

- Coordinate geometry
- Trigonometric identities
- Differentiation
- Functional notation including $f'(x)$

Introduces:

- Differentiate functions $\sin x$ and $\cos x$
- Differentiate exponential and logarithmic functions
- Use the chain rule to differentiate composite functions, or functions of another function
- Differentiate the product of two functions
- Differentiate the quotient rule of two functions
- Differentiate trigonometric functions
- 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 and construct simple differential equations

Autumn2

Pure Chapter 1: Integration

Assessment: Chapter assessment 11 Integration

Builds Upon (GCSE (9-1) in Mathematics at Higher Tier):

- Knowledge of e^x and $\ln x$
- Laws of logarithms
- Trigonometry
- Differentiation
- Parametric Equations

Builds Upon (AS Mathematics - Pure Mathematics content):

- Knowledge of e^x and $\ln x$

- Laws of logarithms
- Trigonometry
- Differentiation and integration

Introduces:

- Use knowledge of derivatives to integrate familiar functions
- Integrate a function of form $f(ax+b)$ using the reverse of the chain rule for differentiation
- Use trigonometric identities in integration
- Use the reverse of the chain rule to integrate more complex functions
- Integrate functions by making a substitution
- Integrate functions by using integration by parts
- Integrate functions by using partial fractions
- Use integration to find the area under a curve
- Use the trapezium rule to approximate the area under a curve
- Use integration to solve differential equations
- Use differential to model real-life situations

Spring 1

Pure Chapter 8: Parametric equations

Assessment: Chapter assessment 8 Parametric equations

Builds Upon (GCSE (9-1) in Mathematics at Higher Tier):

- Coordinate geometry
- Changing the subject of the formula, and substitution
- Graphs of linear, quadratic and trigonometric functions

Builds Upon (AS Mathematics - Pure Mathematics content):

- Coordinate geometry
- Trigonometric identities
- Knowledge of a variety of functions involving powers, roots, trigonometric functions, exponentials and logarithms

Pure Chapter 1 (Year 2): Algebraic Methods

Assessment: Chapter assessment 12 Vectors

Builds Upon (GCSE (9 1) in Mathematics at Higher Tier):

- Vectors

Builds Upon (AS Mathematics - Pure Mathematics content):

- Proof
- Vectors

<p>Introduces:</p> <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 	<p>Introduces:</p> <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
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Pure Chapter 10: Numerical methods

Assessment: Chapter assessment 10 Numerical Methods

Builds Upon (GCSE (9-1) in Mathematics at Higher Tier):

- Iterations and approximate areas under curves
- Kinematics (velocity-time graphs)

Builds Upon (AS Mathematics - Pure Mathematics content):

- Graphs, roots and functions
- Differentiation and integration

Introduces:

- 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 to the solutions of equations of the form $f(x)=0$
- Use numerical methods to solve problems in context

Spring 2

Revision and exam practice

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