MATHEMATICS

Year 12

What are the aims and intentions of this curriculum?

The aim of our Key Stage 5 Curriculum is to help students to understand mathematics and mathematical processes in a way that promotes confidence, fosters enjoyment and provides a strong foundation for progress to further study. Students will learn to use the mathematical knowledge gained to make logical and reasoned decisions in solving problems both within pure mathematics and in a variety of contexts, and communicate the mathematical rationale for these decisions clearly.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	Y1 Pure - Quadratics	• Modelling with quadratics • Solving quadratic equations • Completing the square • Functions • Quadratic graphs • The discriminant	**A01: Use and apply standard techniques** Learners should be able to: ● select and correctly carry out routine procedures; and ● accurately recall facts, terminology and definitions **AO2: Reason, interpret and communicate mathematically** Learners should be able to: ● construct rigorous mathematical arguments (including proofs); ● make deductions and inferences; ● assess the validity of mathematical arguments; ● explain their reasoning; and ● use mathematical language and notation correctly. **A03: Solve problems within mathematics and**	Topic Tests Maths watch End of term Assessments
	Y1 Pure – Equations and Inequalities	• Solve linear simultaneous equations by elimination and by subs • Solving simultaneous equation including one non-linear equation • Solving linear inequalities • Solving quadratic Inequalities • Graphical inequalities • Regions on a graph		
	Y1 Pure – Graphs and Transformations	• Sketching cubic functions • Sketching quartic functions • Sketching reciprocal functions • Using intersection points • Translating and stretching graphs • Transformations of graphs		
	Y1 Pure – Co ordinate Geometry (Linear Functions)	• Interpreting the equation of a straight line • Formula to finding the equation of a st. line • Parallel and perpendicular lines • Length and area problems		

	Y1 Pure – Co-ordinate Geometry (Circles)	• Modelling with straight lines • Midpoints and perpendicular bisectors • Equation of a circle • Intersections of straight lines & circles • Using tangents and chord properties • Circles and triangles	**in other contexts** Learners should be able to: ● translate problems in mathematical and non-mathematical contexts into mathematical processes; ● interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations; ● translate situations in context into mathematical models; ● Use mathematical models; and ● evaluate the outcomes of modelling in context, recognise the limitations	
	Statistics – Data collection	• Populations and samples • Sampling mechanisms • Types of data • The large data set Statistics – Measures of location and spread • Measures of central tendency • Measures of spread • Variance and standard deviation		
	Statistics – Representation of data	• Coding • Outliers • Boxplots • Cumulative frequency • Histograms • Comparing data		
Autumn 2	Y1 Pure – Algebraic Methods & Proof	• Algebraic fractions • Dividing Polynomials • Factor & Remainder theorem • Mathematical Proof • Methods of Proof	**A01: Use and apply standard techniques** Learners should be able to: ● select and correctly carry out routine procedures; and ● accurately recall facts, terminology and definitions	Topic Tests Maths watch
	Y1 Pure – Sine and Cosine Rules	• Sine Rule to find sides and angles • Cosine Rule to find unknown sides and angles • Combining Sine Rule and Cosine Rule with Pythagoras • Sine Rule for area of a triangle	**AO2: Reason, interpret and communicate mathematically** Learners should be able to:	End of term Assessments Trial Examination
	Y1 Pure –Trig Identities and Equations			

		• The two trig identities • Solving trig equations • Solving quadratic trig equations	● construct rigorous mathematical arguments (including proofs); ● make deductions and inferences; ● assess the validity of mathematical arguments; ● explain their reasoning; and ● use mathematical language and notation correctly.	
	Statistics – Probability	• Tree diagrams • Venn diagrams & set notation • Mutually exclusive and independent events • Conditional probability	**A03: Solve problems within mathematics and in other contexts** Learners should be able to:	
	Statistics – Statistical distributions	• Probability distributions (DRVs) • Binomial distribution • Cumulative probabilities	● translate problems in mathematical and non-mathematical contexts into mathematical processes; ● interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations; ● translate situations in context into mathematical models; ● Use mathematical models; and ● evaluate the outcomes of modelling in context, recognise the limitations	
Spring 1	Mechanics – Constant Acceleration	• Displacement/velocity –time graphs • suvat equations • vertical motion under gravity	**A01: Use and apply standard techniques** Learners should be able to: ● select and correctly	Topic Tests Maths watch

	Mechanics – Forces & Motion	• Force diagrams • Using vectors • F = ma • Motion in 2D • Connected particles & pulleys	carry out routine procedures; and ● accurately recall facts, terminology and definitions **AO2: Reason, interpret and communicate mathematically** Learners should be able to: ● construct rigorous mathematical arguments (including proofs); ● make deductions and inferences; ● assess the validity of mathematical arguments; ● explain their reasoning; and ● use mathematical language and notation correctly. **A03: Solve problems within mathematics and in other contexts** Learners should be able to: ● translate problems in mathematical and non-mathematical contexts into mathematical processes; ● interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations; ● translate situations in context into mathematical models; ● Use mathematical	End of term Assessments Trial Examination
	Y1 Pure – Differentiation	• Finding the gradient function • Finding the gradient function for functionrequiring expansion or simplifying • Find second derivatives Find the equation of a tangent or normal • Increasing and decreasing functions • Stationary points and Points of Inflexion • Using turning points in context • Sketching gradient functions • Modelling with differentiation.		
	Y1 Pure – Binomial Expansion	• Pascal's triangle • Factorial Notation • Binomial expansion • Solving binomial problems • Binomial estimation		

			models; and ● evaluate the outcomes of modelling in context, recognise the limitations	
Spring 2	Y1 Pure – Integration	• Understand Integration as part of calculus • Use the integral sign • Integrate functions requiring expansion or simplifying • Find the constant of integration • Definite integration • Find an area under a curve (including curves under the x axis) • Area of shapes involving curves and straight line	Solve problems within mathematics and in other contexts Learners should be able to: ● translate problems in mathematical and non-mathematical contexts into mathematical processes; ● interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations; ● translate situations in context into mathematical models; ● Use mathematical models; and ● evaluate the outcomes of modelling in context, recognise the limitations	Topic Tests Maths watch End of term Assessments
	Statistics – Hypothesis Testing	• Hypotheses • Finding critical values • One tailed and two tailed tests		
	Mechanics – Variable Acceleration	• Functions of time • Using differentiation • Maxima and minima problems		
Summer 1	Y1 Pure – Exponentials and Logs	• Writing expressions as a logarithm • Laws of logarithms • Solving exponentials • Changing the base	A01: Use and apply standard techniques Learners should be able to: ● select and correctly carry out routine procedures; and ● accurately recall facts, terminology and definitions AO2: Reason, interpret and communicate mathematically Learners	Topic Tests Maths watch End of term Assessments
	Y1 Pure – Vectors	• Vectors • Representing vectors • Magnitude and direction • Position vectors • Solving geometric problems		

	Mechanics – Modelling	• Modelling with vectors • Constructing a model & assumptions • Quantities & units • Using vectors	should be able to: ● assess the validity of mathematical arguments; ● explain their reasoning; and use mathematical language and notation correctly.	
Summer 2	Y2 Pure – Algebraic Methods	• Simplify algebraic fractions • Calculate with algebraic fractions • Partial fractions • Partial fractions with repeated factors in • the denominator • Algebraic division	**A01: Use and apply standard techniques** Learners should be able to: ● select and correctly carry out routine procedures; and ● accurately recall facts, terminology and definitions	Topic Tests Maths watch End of term Assessments
	Y2 Pure – Sequences and Series	• Nth term • Recurrence relationship sequences • Arithmetic sequences • Sum to n of an arithmetic sequence • Using Sigma notation • Geometric sequences • Geometric progression and the nth term Sum of a geometric sequence • Sum to infinity of a geometric sequence • Recurrence relations • Modelling with series	**AO2: Reason, interpret and communicate mathematically** Learners should be able to: ● construct rigorous mathematical arguments (including proofs); ● make deductions and inferences; ● assess the validity of mathematical arguments; ● explain their reasoning; and ● use mathematical language and notation correctly.	
	Y2 Pure – Binomial Expansion	• Using binomial expansion with negative &fractional powers		
	Statistics – Conditional Probability	• Set notation • Conditional probability • Venn diagrams • Probability formulas • Tree diagrams		
			A03: Solve problems	

		within mathematics and in other contexts Learners should be able to: ● translate problems in mathematical and non-mathematical contexts into mathematical processes; ● interpret solutions to problems in their original context, and, where appropriate, evaluate their accuracy and limitations; ● translate situations in context into mathematical models; ● Use mathematical models; and ● evaluate the outcomes of modelling in context, recognise the limitations	