

Mathematics: Learning Plan 2020-2022

Specification: 8MA0/9MA0

Teacher A: S Hamilton

Teacher B: C Turze

Teacher C: J Thrower

Year 12

Term	Teacher A			Teacher B			Teacher C		
	Exam Focus	Classroom Learning	Independent Learning	Exam Focus	Classroom Learning	Independent Learning	Exam Focus	Classroom learning	Independent learning
1	Paper 1 – Pure	Algebra and functions 1 <ul style="list-style-type: none"> Manipulation, indices and surds Quadratics 	Transition worksheets Expanding brackets and simplifying Surds Rules of indices Factorising expressions Completing the square Solving quadratics Sketching quadratics Solving linear simultaneous equation Solving quadratic simult. equations Solving simult. equations graphically	Paper 2 – Stats	Data presentation and interpretation 1 <ul style="list-style-type: none"> Calculate and interpret measures of location and variation Understand and use coding 	Complete Stats and Mech year 1 Chapter 2 exercises 2A-2F Unit 1 test stats and mech Zigzag measures of location and spread	Paper 2 – Mech	Quantities and units in mechanics <ul style="list-style-type: none"> Introduction to modelling Standard SI units Definitions of force, velocity speed, weight, acceleration and displacement Vector and scalar quantities. 	Complete Stats and Mech year 1 Chapter 8 exercise 8A-8C Unit 7 test
	Paper 1 –Pure	Further Algebra <ul style="list-style-type: none"> The binomial expansion Algebraic division Factor theorem proof 	Complete Pure year 1 chapter 8 exercises 8A-8E Chapter 7 exercises 7A-7E Unit 2 test pure Zigzag binomial expansion	Paper 2 – Stats	Statistical distribution <ul style="list-style-type: none"> use and identify discrete distributions calculate probabilities using the binomial distribution 	Complete Stats and mech year 1 Chapter 6 exercises 6A-6C Unit 2 test stats and mech Zigzag statistical distributions	Paper 2 – Mech	Kinematics 1 <ul style="list-style-type: none"> Graphical representation of velocity, acceleration and displacement 	Complete Stats and Mech year 1 chapter 9 exercise 9A-9B
2	Paper 1 – Pure	Coordinate Geometry 1 <ul style="list-style-type: none"> Straight line graphs Parallel and perpendicular Length and area problems 	Transition worksheets: Straight line graphs Parallel and perpendicular lines Pythagoras theorem Proportion Pure year 1 Chapter 5 exercises 5A-5H Unit 6 test pure Zigzag straight line graphs	Paper 2 – Stats	Probability <ul style="list-style-type: none"> Mutually exclusive events Independent events 	Complete Stats and mech year 1 chapter 5 exercises 5A- 5D Unit 3 test stats and mech Zigzag Probability	Paper 2 – Mech	Kinematics 1 <ul style="list-style-type: none"> Motion in a straight line under constant acceleration, suvat formulae, Vertical motion under gravity 	Complete Stats and Mech year 1 chapter 9 exercise 9C-9E Zigzag constant acceleration Unit 8 test
	Paper 1 – Pure	Coordinate geometry 2 <ul style="list-style-type: none"> Equation of a circle Geometric problems on a grid 	Transitions worksheet Circle theorems Complete Pure 1 chapter 6 exercises 6A -6F Unit 6 test Pure Zigzag circles	Paper 2 – Stats	Statistical sampling <ul style="list-style-type: none"> Introduction to terminology Advantages and disadvantage Understand and use sampling techniques Compare sampling techniques in context 	Stats and mech year 1 chapter1 exercises 1A-1E Unit 4 test stats and mech Zigzag data collection	Paper 2 – Mech	Forces and Newton's laws <ul style="list-style-type: none"> Newton's First Law Forces diagrams Equilibrium i,j system 	Complete Stats and mech year 1 Chapter 10 exercises 10A-10B
	Paper 1 – Pure	Differentiation <ul style="list-style-type: none"> Definition Differentiating polynomials Second derivative Gradients Tangents Normal Maxima and minima 	Transition worksheet volume and surface area of 3D shapes Complete Pure year 1 Chapter 12 exercises 12A-12K Unit 3 test Pure Zigzag differentiation						
3	Paper 1 – Pure	Integration <ul style="list-style-type: none"> Definition as opposite of differentiation 	Transition worksheet Area under a graph	Paper 2 – stats	Statistical hypothesis testing <ul style="list-style-type: none"> Language of hypothesis testing 	Stats and Mech year 1 Chapter 7 exercises 7A- 7D	Paper 2 – Mech	Forces and Newton's Laws <ul style="list-style-type: none"> Newton's second law 	Stats and mech year 1

	Paper 1 - Pure	<ul style="list-style-type: none"> Indefinite integrals Definite integrals and areas under curves 	Complete Pure year 1 Chapter 13 exercises 13A-13G Unit 4 (pure) test Zigzag integration		<ul style="list-style-type: none"> Significance levels Carry out hypothesis testing involving binomial distribution 	Unit 5 test stats and mech Zigzag Hypothesis testing		<ul style="list-style-type: none"> Newton's third law Equilibrium Smooth pulley problems 	Chapter 10 exercise 10C-10F Unit 9 test stats and mech Zigzag modelling in mechanics
	Paper 1 - Pure	<ul style="list-style-type: none"> Trigonometry (part 1) Trigonometric ratios Trigonometric graphs 	Transition worksheet trigonometry Complete Pure year 1 Chapter 9 exercises 9A-9G Zigzag trigonometry ratios						
	Paper 1 - Pure	<ul style="list-style-type: none"> Trigonometry (part 2) Angles in all four quadrants Exact values of trig ratios 	Complete pure year 1 Chapter 10 exercise 10A-10B						
4	Paper 1 - Pure	<ul style="list-style-type: none"> Algebra and Functions 2 Inequalities, linear and quadratic Graphs - cubic, quartic, reciprocal Transformation of graphs 	Transitions worksheets Linear inequalities Quadratic inequalities Complete Pure year 1 Chapter 3 exercise 3D-3G Unit 8 test pure Zigzag inequalities	Paper 2 - Stats	<ul style="list-style-type: none"> Data presentation and interpretation Interpret diagrams for single variable data Interpret scatter graphs and regression lines Recognise outliers 	Complete Stats and mech year 1 Chapter 3 exercises 3A-3E Chapter 4 exercises 4A-4B Unit 6 stats and mech Zig zag representing data and correlation	Paper 2 - Mech	<ul style="list-style-type: none"> Kinematics 2 Variable force Calculus to determine rates of change for kinematics Use of integration for kinematics problems 	Stats and Mech year 1 Complete Stats and mech year 1 Chapter 11 exercises 11A-11E Unit 10 test stats and mech Zigzag Variable acceleration
	Paper 1 - Pure	<ul style="list-style-type: none"> Trigonometry (part 2) Trigonometric identities Solving trigonometric equations 	Complete pure year 1 Chapter 10 exercise 10C-10F Unit 7 test pure Zig zag trig identities						
5	Paper 1 - Pure	<ul style="list-style-type: none"> Exponentials and logarithms Exponential functions Natural Logarithms 	Pure year 1 Chapter 14 exercises 14A-14H Unit test 9 Zigzag exponentials and logs	Papers 1&2 - Pure	<ul style="list-style-type: none"> Vectors (2D) Definitions Magnitude Addition and scalar multiplication Vectors (part 2) Position vectors Distance between two points Geometric problems 	Complete Pure year 1 Chapter 11 exercises 11A-11C Unit 5 test pure Pure year 1 Chapter 11 exercises 11D-11F Unit 5 test pure Zig zag vectors	Paper 3 - Mech	<ul style="list-style-type: none"> Forces at any angle Resolving forces 	Complete Stats and mech year 2 chapter 5 exercises 5A and 5B
	Papers 1&2 - Pure	<ul style="list-style-type: none"> Algebra and partial fractions Simplifying algebraic fractions Partial fractions 	Complete Pure year 2 Chapter 1 exercises 1B-1G Zig zag algebraic methods				Papers 1&2 - Pure	<ul style="list-style-type: none"> Trigonometry Radians Small angles Secant, cosecant, cotangent Inverse trig functions Compound angle formulae 	Complete pure year 2 Chapter 5 exercise 5A and B, 5F, 5E Chapter 6 exercises 6A-6E Chapter 7 exercise 7A-7D
6	exam prep		Practice papers	exam prep		Practice papers	exam prep		Practice papers
	Papers 1&2 - Pure	<ul style="list-style-type: none"> Differentiation Differentiating $\sin x$ and $\cos x$ from first principles Differentiating exponentials and logs Differentiating products, quotients and implicit functions. Second derivatives Rates of change problems 	Complete Pure year 2 Chapter 9 all except 9.7 exercises 9A-9F, 9H-9J Zig zag differentiation 1 and 11 (but leave parametric questions)	Paper 3 - Stats	<ul style="list-style-type: none"> Normal distribution Understand and be able to use the Normal distribution 	Complete stats and mech year 2 Chapter 3 exercises 3A-3E	Papers 1&2 - Pure	<ul style="list-style-type: none"> Trigonometry Compound angle formulae 	Complete pure year 2 Chapter 7 exercise 7A-7D Zigzag radians
							Paper 3 - Mech	<ul style="list-style-type: none"> Further Kinematics Constant acceleration Equations of motion in 2D i,j system 	Complete stats and mech year 2 Chapter 8 exercises 8A and 8B

Year 13

Term	Teacher A			Teacher B		
	Exam Focus	Classroom Learning	Independent Learning	Exam Focus	Classroom Learning	Independent Learning

1	<p>Paper 1, 2 – Pure</p> <p>Paper 3 – Mechanics</p> <p>Papers 1&2 – Pure</p> <p>Paper 3 – Mechanics</p>	<p>Proof</p> <ul style="list-style-type: none"> • Proof by induction • Proof by exhaustion • Proof by contradiction • Disproof by counter example <p>Applications of Kinematics</p> <ul style="list-style-type: none"> • Projectiles <p>Functions and modelling</p> <ul style="list-style-type: none"> • Modulus function • Composite and inverse functions • Transformations • Modelling with functions <p>Forces at any angle</p> <ul style="list-style-type: none"> • Friction forces including coefficient of friction 	<p>Complete pure 2 Chapter 1 exercise 1A</p> <p>Complete stats and mech year 2 Chapter 6 exercises 6A - 6D Zigzag Kinematics and projectiles</p> <p>Complete Pure year 2 Chapter 2 exercises 2A-2G Zig zag functions and graphs</p> <p>Complete stats and mech year 2 Chapter 5 exercise 5C</p>	<p>Papers 1&2 – Pure</p> <p>Paper 3 – Statistics</p>	<p>Integration</p> <ul style="list-style-type: none"> • Integrating all powers of x, exponentials and trig functions • Using reverse of differentiation • Using trig identities to manipulate integrals • Integration by substitution <p>Normal distribution (part 2)</p> <ul style="list-style-type: none"> • Using the normal as an approximation to the binomial • Selecting the appropriate distribution 	<p>Complete Pure year 2 Chapter 11 exercises 11A-11E Zigzag Integration part I Unit test 10 Pure year 2</p> <p>Complete stats and mech year 2 Chapter 3 exercises 3F</p>
2	<p>Paper 3 – Mechanics</p> <p>Papers 1&2 – Pure</p>	<p>Application of forces</p> <ul style="list-style-type: none"> • Equilibrium and statics • Dynamics of a particle <p>Series and sequences</p> <ul style="list-style-type: none"> • Arithmetic and geometric progressions • Proof of sum formulae • Sigma notation • Recurrence relations • Iterations 	<p>Complete stats and mech year 2 Chapter 7 exercises 7A - 7F</p> <p>Complete Pure year 2 Chapter 3 exercises 3A – 3I</p>	<p>Paper 3 – Statistics</p> <p>Papers 1&2 – Pure</p>	<p>Normal distribution (part 3)</p> <ul style="list-style-type: none"> • Statistical hypothesis testing for the mean of the normal distribution <p>Integration</p> <ul style="list-style-type: none"> • Integration by parts • Use of partial fractions • Areas under graphs • Understand area as the limit of a sum • Trapezium rule • Differential equations 	<p>Complete stats and mech year 2 Chapter 3 exercises 3G</p> <p>Complete Pure year 2 Chapter 11 exercises 11F,G,I,J Zigzag Integration part II Unit test 11 pure year 2</p>
3	<p>Paper 3 – Mechanics</p> <p>Papers 1&2 – Pure</p> <p>Paper 3 – Mechanics</p>	<p>Further Kinematics</p> <ul style="list-style-type: none"> • Variable acceleration (use of calculus) • Use of vectors for displacement) <p>Binomial theorem</p> <ul style="list-style-type: none"> • Use binomial expansion for rational powers • Know when the series is valid • Use of partial fractions in binomial problems <p>Moments</p> <ul style="list-style-type: none"> • Forces' turning effect 	<p>Complete stats and mech. Year 2 Chapter 8 exercises 8C-8E</p> <p>Pure year 2 Chapter 4 Exercises 4A -4C Zig zag binomial expansions Unit 5 test pure</p> <p>Stats and Mech year 2 Chapter 4 exercises 4A-4E Unit 4 test stats and mech year 2 Zigzag CAT 7</p>	<p>Papers 1&2 – Pure</p> <p>Paper 3 – Statistics</p>	<p>Trigonometry</p> <ul style="list-style-type: none"> • Arcs and sectors • Compound, double and half angle formulae • Geometric proof of compound formulae <p>Probability</p> <ul style="list-style-type: none"> • Use of set notation for probability • Conditional probability • Questioning assumptions in probability 	<p>Pure year 2 Chapter 5 exercises 5C -5D Chapter 7 exercises 7A-7G Unit test 6 –trigonometry year 2 Zig zag Trig part 1 and trig part 2</p> <p>Stats and Mech year 2 Chapter 2 exercises 2A-2E Zigzag –conditional probability Unit test 2 stats and mech year 2</p>
4	<p>Papers 1&2 – Pure</p>	<p>Numerical methods</p> <ul style="list-style-type: none"> • Location of roots • Solving by iterative methods • Newton Raphson method • Problem solving 	<p>Pure year 2 Chapter 10 exercises 10A-1D Zigzag numerical methods Unit test 9 year 2 pure</p> <p>Stats and Mech year 2</p>	<p>Papers 1&2 – Pure</p>	<p>Trigonometry</p> <ul style="list-style-type: none"> • $R\cos(x+a)$, $R\sin(x+a)$ • Proving trig identities • Solving problems in context 	<p>Pure year 2 Chapter 7 exercises 7E-7G Unit test 6 –trigonometry year 2 Zig zag Trig part 1 and trig part 2</p>

	<p>Paper 3 - Mechanics</p> <p>Papers 1&2 – Pure</p>	<p>Application of forces(part 2)</p> <ul style="list-style-type: none"> • Equilibrium and statics • Ladder problems <p>Parametric equations</p> <ul style="list-style-type: none"> • Definition and converting between forms • Curve sketching and modelling • Differentiating parametric equations • Integrating parametric functions • Areas under curves 	<p>Chapter 7 exercises 7A-7D</p> <p>Unit test 7 year 2 stats and mech</p> <p>Pure year 2</p> <p>Chapter 8 exercises 8A-E</p> <p>Chapter 9 exercise 9G</p> <p>Chapter 11 exercise 11H</p> <p>Unit test 7 Pure year 2</p> <p>Zigzag parametric equations</p>	<p>Paper 3 – statistics</p>	<p>Regression and correlation</p> <ul style="list-style-type: none"> • Change of variables • Correlation coefficients • Statistical testing for zero correlation 	<p>Stats and Mech year 2</p> <p>Chapter 1 exercises 1A-1C</p> <p>Zigzag regression and correlation</p> <p>Unit test 1 stats and mech year 2</p>
5		<p>Revision and exam Preparation</p>		<p>Papers 1&2 – Pure</p>	<p>Vectors</p> <ul style="list-style-type: none"> • Use of vectors in 3d • Knowledge of column vectors and i, j, k unit vectors in 3D <p>Revision and exam preparation</p>	<p>Pure year 2</p> <p>Chapter 12 exercises 12A-12D</p> <p>Zigzag vectors</p> <p>Unit test 12 pure year 2</p>