Year 13 Pure

Teacher A	Teacher B
Algebraic methods and proof - Know and apply the various types of proof (proof by contradiction, exhaustive proof etc - Add and subtract algebraic fractions - Multiply and divide algebraic fractions - Application of the factor theorem - Factorising polynomial completely - Partial proper fractions - Partial improper fractions - Algebraic division	Functions and modelling - Modulus function and its graphs - Solve equations and inequalities involving modulus functions - Domain and range of functions - One-to-one and many-to-one functions - Composite functions - Inverse of a function and sketch the graphs - Conditions for inverse function to exist - Transformation of functions - Composite transformation of functions and describe their effect geometrically - Solve problems involving modulus and transformation
Series and sequences - Sequence of numbers (finite and infinite) - Difference between sequence and series - Convergent and divergent sequence - Difference between arithmetic and geometric sequence - Nth term and sum of terms of AP - Nth term and sum of terms of GP - Sum of GP to infinity and conditions - Solve problems involving AP and GP - The use of the sigma notation - Difference between increasing, decreasing and periodic sequence - Application of recurrence and iteration to solve sequence problems	Binomial Expansion - Know that the year 12 formula for binomial expansion fails when the power is not an whole number - Binomial expansion for negative and fractional powers - Binomial expansion and problem solving - Partial fraction and binomial expansion - Percentage error
Assessment 1	

Radian - Understand the definition of radian - Convert between radian and degree - Exact value of sin, cos and tan in radian - Derive and us ethe formula for arc length and area of sector - Solve trigonometric equations with a given interval in radian - Application of the two trig identities taught in year 12 to solve trig equations - Small angle approximation for sin, cos and tan.	Parametric equations - Understand the difference between catesian and parametric systems of expressing coordinates - Convert between parametric and cartesian coordinates - Plot and sketch curves in parametric form - Solve coordinate geometry problems using parametric equations - Recognise some standard curves in parametric and use them to solve problems
Trigonometric functions - Understand secant, cosecant and cotangent and their graphs - Simplify expressions and solve equations involving sec, cosec and cot - Derive and apply identities for sec, cosec and cot and apply them to solve tri equations - Work with the inverse trig functions and sketch their graphs - Trigonometric proofs	Differentiation - Find the derivative of sinx and cosx from first principle - Differentiate e^{kx} and lnx functions and sketch their graphs - Equation of tangents and normal to $y = e^{kx}$ and y = lnx functions - Know and apply the chain rule - Know and apply the product rule - Know and apply the quotient rule - Apply differentiation rules to trig functions - Parametric differentiation - Gradient at a given point from a parametric equations - Equation of tangent and normal to parametric functions - Implicit differentiation involving two variables - Gradient of a curve using implicit differentiation - Stationary point and implicit differentiation - Nature of stationary point and rate of change

	- Find the value of an exponential function after a given time - Equation of exponential growth problems
Mock Exam (Everything including year 12 work except: Integration, vectors and numerical methods)	
Trigonometry and modelling - Use the compound angle identities to rearrange expressions - Use the compound angle identities to rearrange and solve equations - Proof geometrically the three compound angle formulae - Prove other identities using the compound angle identities - Double angle formula and other identities - Triple angle formula and other identities - Express $a\cos\theta + b\sin\theta$ as a single sine or cosine function - solve equations of the form $a\cos\theta + b\sin\theta = c$ in a given interval - Modell and solve trig functions to solve problems in context, including those involving vectors, kinematics and forces	Integration - Integration by inspection using the reverse of differentiation - Know that integral of 1/x = lnx and integral of $e^x = e^x$ - Integration by substation - Integration by part - Integration of trigonometric expressions - recognise integrals of the form $\int \frac{f'(x)}{f(x)}dx = \ln\|f(x)\| + c$; - Use trigonometric identities to manipulate and simplify expressions to a form which can be integrated directly. - Integrating rational expressions by using partial fractions with linear denominators - Simplify integral of rational functions using the laws of logarithm - Area under a curve or between two given points - Use the trapezium rule to estimate area under a curve and determine if it overstate or understate the actual area. - Write a differential equation from worded problems - Solve differential equation - Find particular solutions of differential equations
Numeric method - Locate roots by considering change in sign	•

- Use numerical methods to solve solutions of equations - Iteration - Staircase and cobweb diagram - Convergence and iteration - Solve equations approximately using Newton-Raphson method - Understand that the Newton-Raphson method works in geometrical terms - Problem solving and numerical method	
Vectors - Vectors in three dimensions - Magnitude of 3D vectors - Unit vector and its application - Add and subtract 3D vectors - Scalar multiplication of 3D vectors - Position vectors and distance between two points - Vectors and problem solving	•
Assessment 3 (Test of Pure Knowledge)	

Year 13 Applied

Teacher A- Statistics	Teacher B- Mechanics
Regression, correlation and Hypothesis testing - Change variables of regression line by using logarithms - Estimate values from regression line - Correlation coefficient interpretation - Product moment correlation coefficient and its interpretation - Hypothesis testing of PMCC	Forces at any angle (part 1) - Language of forces - Identify all forces acting on a particle and represent them diagrammatically - Finding the resultant force (magnitude and direction) - Resultant of several concurrent forces - Resolve forces into components and select suitable resolutions
Probability - Use probability formulae and notations - Use probability tree diagrams - Use Venn diagrams and its components - Use tw0-way table - Use the conditional probability formula $\mathrm{P}(A \mid B) = \frac{\mathrm{P}(A \cap B)}{\mathrm{P}(B)}$. - Model with probability - Critique assumptions made and the likely effect of more realistic assumptions	Further kinematics (part 1) - Use of constant acceleration formulae - Position vectors, velocities, acceleration, and displacement in vector form - Language of kinematics in 2D - Use velocity triangles and problem solving - SUVAT constant acceleration in 2D - Apply the equations of motion to **i**, **j** vector problems - Use $\boldsymbol{v} = \boldsymbol{u} + \boldsymbol{a}t$, $\boldsymbol{r} = \boldsymbol{u}t + \frac{1}{2}\boldsymbol{a}t^2$ etc. with vectors given in **i** , **j** or column vector form.
Normal distribution - Properties of normal distributions - Calculate probabilities from normal distributions - know the position of the points of inflection of a Normal distribution. - Mean and variance of a normal distribution - Understand and apply continuity corrections - Use the Normal distribution as an approximation to the binomial distribution. - Statistical hypothesis test for the mean of normal distributions	Application of kinematics – Projectile - Understand factors affecting projectile - Find time of flight of a projectile - Find range and maximum height of a projectile - derive formulae to find the greatest height, the time of flight and the horizontal range (for a full trajectory) - Modify projectile equations to take account of the height of release; - Derive and use the equation of the path.

- Interpret results of the hypothesis testing in context	
	Forces at any angle (part 2) - Understand that a rough plane creates frictional force which act against direction of motion - Roughness' of two surfaces is represented a coefficient of friction represented by μ; - Know that $0 \leq \mu$ but that there is no theoretical upper limit for μ although for most surfaces it tends to be less than 1 and that a 'smooth' surface has a value of $\mu = 0$; - Draw force diagrams involving rough surfaces which include the frictional force - Limiting equilibrium formula $F \leq \mu R$.
	Application of forces (part 1) - Equilibrium under a set of concurrent forces (resultant = 0) - Vectors representing forces in equilibrium form a closed polygon; - Solve problems involving equilibrium of a particle under coplanar forces, including particles on inclined planes and 2D vectors; - Understand and apply Newton's second law of motion - F = ma for 1 dimensional motion - Formulate and solve equations of motion for a particle in 2D motion where the resultant = ma - Formulate and solve equations of motion for connected particles, where one of the parts could be inclined and/or on a rough plane.
	Further kinematics (part 2) - Extend techniques for 1D to 2D by using vectors of equations for variable forces/acceleration

	- Know and apply the language and notation for Kinematics for variable motions in 2D
	Moment: forces' turning effect - Know that moment = perpendicular force times distance - Draw mathematical model to represent horizontal rod problems - Conditions for equilibrium and apply them - Solve problems when a beam is at the point of tilting
	Applications of forces (part 2) - Solve statics problems for a system of forces which are not concurrent (ladder) and apply the principles of moments for forces at any angle