MATHEMATICS

A LEVEL Year 12

TEACHER 1
PURE MATHS (P) AND MECHANICS (M)

1. P - KEY SKILLS
- Index laws
- Brackets

2. P - ALGEBRAIC METHODS 1
- Algebraic fractions
- Dividing polynomials
- Factor theorem

3. P - PROOF
- Algebraic proof
- Proof by exhaustion or counter example

4. P - EQUATIONS AND INEQUALITIES
- Simultaneous equations
- Linear and quadratic inequalities
- Inequalities and regions on graphs

5. P - CALCULUS 1
- Gradients of curves
- Differentiate polynomials
- Integrating polynomials
- Finding functions
- Definite integrals

6. P - CALCULUS 2
- Gradients, tangents and normals
- Increasing and decreasing functions
- Second order derivatives
- Stationary points
- Areas under curves
- Areas under x-axis
- Areas between curves and lines

7. P - BINOMIAL EXPANSION
- Pascal's triangle
- Factorial notation
- Binomial expansion
- Solving binomial problems including estimation

8. M - MODELLING IN MECHANICS
- Constructing a model and assumptions
- Quantities and units
- Vectors

9. M - CONSTANT ACCELERATION
- Displacement time graphs
- Velocity time graphs
- Constant acceleration formulae
- Gravity

10. M - FORCES
- Forces diagrams and vectors
- Forces and acceleration
- Motion in 2D
- Connected particles and pulleys

11. M - VARIABLE ACCELERATION
- Functions of time
- Differentiation, maxima and minima problems
- Using integration
- Constant acceleration formulae

12. P - VECTORS (2D AND 3D)
- Representing vectors
- Magnitude and direction
- Geometric problems and modelling
- Applications to mechanics

13. P - CALCULUS 3
- Sketching gradient functions
- Modelling

TEACHER 2
PURE MATHS (P) AND STATISTICS (S)

1. P - KEY SKILLS
- Surds

2. P - QUADRATICS
- Completing the square
- Functions
- Quadratic graphs and modelling
- The discriminant

3. P - GRAPHS AND TRANSFORMATIONS
- Cubic, quartic and reciprocal graphs
- Intersections
- Sketching and translation graphs
- Transforming functions

4. P - STRAIGHT-LINE GRAPHS
- Equations of straight lines
- Parallel and perpendicular lines
- Geometric problems and modelling with straight lines

5. P - CIRCLES
- Mid-points and perpendicular bisectors
- Equations of circles
- Tangents, chords and triangles

6. P - TRIGONOMETRY
- Sine, cosine and area rules
- Solve problems with triangles
- Trigonometric graphs and their transformations

7. P - TRIGONOMETRIC EQUATIONS
- Angles in 4 quadrants and exact values
- Trigonometric identities and equations

8. P - EXPONENTIALS AND LOGARITHMS 1
- Exponential functions and e^x
- Laws of logarithms

9. S - DATA COLLECTION
- Populations, sampling and types of data
- The large data set

10. S - MEASURES OF LOCATION AND SPREAD
- Measures of location
- Measures of spread
- Variance and standard deviation
- Coding

11. S - PROBABILITY
- Calculating Probabilities
- Venn diagrams
- Mutually exclusive and independent events
- Tree diagrams

12. S - REPRESENTATION OF DATA
- Outliers
- Box Plots
- Cumulative frequency
- Histograms

13. S - DISTRIBUTIONS
- Probability distributions
- The binomial distribution

14. S - HYPOTHESIS TESTING
- Hypothesis testing
- Critical values

15. S - CORRELATION
- Correlation
- Linear regression

16. P - EXPONENTIALS AND LOGARITHMS 2
- Modelling
- Solving equations with logs and natural logs
- Logs and non-linear data

A LEVEL Year 13

TEACHER 1
PURE MATHS (P) AND MECHANICS (M)

1. P - ALGEBRAIC METHODS 2
- Proof by contradiction
- Algebraic fractions
- Partial Fractions
- Algebraic division

2. M - MOMENTS
- Moments and resultant moments
- Equilibrium
- Centre of mass
- Tilting

3. P - CALCULUS 4
- Chain, product and quotient rules
- Integrating trigonometry including reverse chain rule
- Integration by parts
- Partial fractions

4. P - PARAMETRIC EQUATIONS
- Parametric equations
- Using trigonometric identities
- Curve sketching
- Intersections
- Modelling
- Parametric differentiation

5. P - CALCULUS 5
- Differentiate complex trigonometric functions
- Using second derivatives

6. M - APPLICATION OF FORCES
- Resolving forces
- Inclined planes
- Friction

7. P - CALCULUS 6
- Implicit differentiation
- Rates of change
- Reverse chain rule
- Integration by substitution
- Integration by parts
- Finding area
- Trapezium rule
- Differential equations

8. M - PROJECTILES
- Horizontal projection
- Horizontal and vertical components
- Projection

9. M - FURTHER KINEMATICS
- Vectors in kinematics
- Vectors with projectiles
- Variable acceleration and vectors
- Differentiating and integrating vectors

TEACHER 2
PURE MATHS (P) AND STATISTICS (S)

1. P - RADIANS
- Radians
- Arc length, area of sectors and segments
- Trigonometric equations
- Small angles approximation

2. P - SEQUENCES AND SERIES
- Arithmetic sequences and series
- Geometric sequences and series
- Sums to infinity
- Sigma notation
- Recurrence relations

3. P - GRAPHS AND FUNCTIONS
- Modulus function
- Functions, composite and inverse functions

4. P - BINOMIAL THEOREM
- Expanding $(a+x)^n$
- Using partial fractions

5. P - TRIGONOMETRIC FUNCTIONS
- Reciprocal trigonometric functions
- Trigonometric identities
- Inverse trigonometric functions
- Addition and double angle formulae
- Simplifying acos x +/- bsinx

6. P - TRIGONOMETRIC MODELLING
- Solving trigonometric equations
- Proving trigonometric identities
- Modelling with trigonometric functions

7. S - NORMAL DISTRIBUTION
- The normal distribution
- The reverse normal distribution
- Finding μ and σ
- Approximating a binomial
- Hypothesis testing

8. S - REGRESSION
- Exponential models
- Measuring correlation
- Hypothesis testing for zero correlation

9. S - CONDITIONAL PROBABILITY
- Set notation
- Conditional probability and Venn diagrams
- Probability formulae
- Tree diagrams

10. P - NUMERICAL METHODS
- Locating roots
- Iteration
- Newton-Raphson