

## AQA 7367 – A-Level Further Mathematics – Advance Information

- This advance information covers all examined components.
- Each bullet point gives the major focus of the content for one question. All questions are covered.
- Where a bullet point lists multiple topics for a question, the most relevant topic is listed first.
- The bullet points are listed in specification order according to the major topic area (ie lettered headings in the specification) of the first topic referred to in each bullet point. Any further sub-ordering required is alphabetical.
- Due to the synoptic nature of some questions, not all relevant topics are listed. Synoptic questions are those that bring together knowledge, skills and understanding from across the specification.
- It is **not** permitted to take this advance information into the examination.
- Students and teachers should consider how to focus their revision of other non-listed parts of the specification, which may be of supplementary use in questions as well as aiding general understanding.

### Paper 1 – Wednesday 25 May pm – Pure Mathematics

- Arithmetic of complex numbers in modulus/argument form
- Complex roots of polynomials
- Loci in the Argand diagram, conversion between Cartesian and modulus/argument form
- Use of complex roots of unity to solve geometric problems
- Eigenvectors and eigenvalues
- Inverse of a  $3 \times 3$  matrix
- Angle between a line and a plane, distance from a point to a plane
- Area enclosed by a polar curve, linear transformations in 2D
- Differentiation of hyperbolic functions
- Logarithmic form of inverse hyperbolic functions
- Damped harmonic motion where damping force is proportional to velocity, types of damping, forming equations for simple harmonic motion using Hooke's Law
- Simple harmonic motion

### Paper 2 – Wednesday 8 June pm – Pure Mathematics

- Proof by induction
- Arithmetic of complex numbers in real/imaginary form
- Eigenvectors and eigenvalues
- Representation of 2D linear transformations using matrices
- Finding Maclaurin series of a function, use in evaluation of limits
- Graphs of conic functions, transformations of graphs
- Rational functions with linear numerator and denominator, associated inequalities
- Roots and coefficients of polynomials
- Mean value of a function
- Volume of revolution, partial fractions\*
- Graphs of hyperbolic functions
- Coupled first order differential simultaneous equations
- Solving first order differential equations analytically, Euler's method (improved) for solving first order differential equations
- Mid-ordinate rule

### Paper 3 – Wednesday 15 June pm – Mechanics and Statistics

#### Mechanics

- Dimensional analysis to predict formulae
- Conservation of momentum for collisions in 2D
- Impulse of a variable force
- Conservation of energy, work done and kinetic energy
- Power
- Work done by a variable force, kinetic energy, conservation of energy
- Vectors in the context of circular motion
- Centre of mass of a system of particles
- Conditions for sliding and toppling, centre of mass of a composite body

#### Statistics

- Probability distribution function for discrete random variable (DRV); mean, variance and standard deviation of a DRV; sums of independent RVs
- Properties of the discrete uniform distribution
- Poisson probabilities: sum of independent Poisson distributions; mean, variance and standard deviation of Poisson distribution
- Means and medians of CRVs, cumulative distribution function
- Probability density function for a continuous random variable (CRV)
- Rectangular distribution
- Chi-squared test for association, Yates correction, Type I and II errors
- Functions to represent the exponential distribution, probabilities
- Confidence interval and hypothesis test for mean of a normal distribution from small sample