Advance Information for Summer 2022

A Level

Further Mathematics B (MEI)

H645

We have produced this advance information to support teachers and students with revision for the Summer 2022 examinations.

Information

- This notice covers all examined components.
- There are no restrictions on who can use this notice.
- You are **not** permitted to take this notice into the exam.
- This document has **4** pages.

Advice

- Students and teachers can discuss this advance information.
- It is advised that teaching and learning should still cover the entire subject content in the specification.
- A Level Further Mathematics assumes all subject content of A Level Mathematics.
- The information is presented in specification order by the main topic of each question and not in question order.
- Topics not explicitly given in the list may appear in low tariff items or via synoptic questions.

If you have any queries about this notice, please call our Customer Support Centre on **01223 553998** or email general.qualifications@ocr.org.uk.

Y420 Core Pure

- Proof by induction
- The Argand diagram
- de Moivre's theorem
- The *n*th roots of a complex number
- Linear transformations and their associated matrices
- Points, lines and planes
- Roots and coefficients of a polynomial equation
- Summation of series
- Improper integral
- Partial fractions
- Polar coordinates
- Hyperbolic equation
- Hyperbolic functions, Maclaurin series
- Solving a 1st order differential equation
- Modelling with 2nd order differential equations in kinematics

Y421 Mechanics major

- Dimensional analysis
- Friction: momentum and impulse treated as vectors
- Equilibrium of a particle
- Equilibrium of a rigid body
- Concepts of work and energy
- The work-energy principle in the context of circular motion
- Conservation of linear momentum; direct impact
- Oblique impact
- Modelling circular motion with uniform speed
- Use of calculus to find centre of mass
- Velocity and position vector; vectors and variable forces
- The equation of the path of a particle in 2 dimensions
- 2nd order differential equations in the context of variable acceleration; extension of an elastic string

Y422 Statistics major

- Expectation and variance
- Discrete probability distribution
- Poisson distribution
- Geometric distribution
- Spearman's rank correlation, hypothesis test
- Regression line equation, goodness of fit
- Chi-squared test for contingency table
- Cumulative distribution function
- Normal distribution
- Kolmogorov-Smirnov test, hypothesis test for an average
- Confidence intervals
- Simulation of random variables, the discrete uniform distribution

Y431 Mechanics minor

- Dimensional analysis
- Vector treatment of forces, friction
- Equilibrium of a rigid body
- Work and energy
- Direct impact, conservation of linear momentum, kinetic energy
- Centre of mass

Y432 Statistics minor

- Discrete random variable; expectation and variance
- Discrete probability distribution
- Discrete uniform distribution
- Spearman's rank correlation coefficient; sampling
- Regression lines
- Chi-squared test for goodness of fit of a Poisson model

Y433 Modelling with algorithms

- Algorithms
- Sorting algorithms
- Networks and graphs, network flows
- Dijkstra's algorithm, solving network problems using technology
- Critical path analysis
- Formulating an LP problem, graphical solution of an LP
- Simplex method

Y434 Numerical methods

- Use of spreadsheets and calculators, solution of equations
- Relative error, chopping/rounding
- Newton-Raphson iteration, fixed point iteration, convergence
- Relaxation, fixed point iteration
- Numerical differentiation
- Midpoint rule, trapezium rule, Simpson's rule
- Polynomial interpolation in context

Y435 Extra Pure

- Investigation of recurrence relations
- Solution of recurrence relations
- Sets, axioms of a group
- Cayley-Hamilton theorem, diagonalisation of a matrix
- Stationary points, contours, surfaces, tangent plane

Y436 Further Pure with technology

- Properties of curves, use of software
- Differential equations, analytical solutions, tangent fields, Euler method
- Write programmes for number theory problems, modular arithmetic, Fermat's little theorem

END OF ADVANCE INFORMATION