

## Advance Information for Summer 2022

### AS Level

### Further Mathematics B (MEI)

### H635

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 **3** 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.
- AS Level Further Mathematics assumes all subject content of AS 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.

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**Y410 Core Pure**

- Arithmetic of complex numbers
- Modulus-argument form of complex numbers
- The Argand diagram
- Linear transformations and their associated matrices
- Simultaneous equations; inverses of square matrices
- Angle between planes; parallel vectors
- Relations between the roots and coefficients of polynomial equations
- Summation of series; proof by induction

**Y411 Mechanics a**

- Forces, friction
- Equilibrium of a particle
- Equilibrium of a rigid body, couple
- The work-energy principle, power; dimensional consistency
- Momentum and impulse treated as vectors; concepts of work and energy
- Direct impact, Newton's experimental law
- Centre of mass

**Y412 Statistics a**

- Probability distributions, expectation and variance
- Probability distributions, probabilities
- Poisson distribution
- The geometric distribution
- Spearman's rank correlation coefficient
- Regression lines for a random variable on a random variable
- $\chi^2$  test for a contingency table

**Y413 Modelling with algorithms**

- Algorithms
- Networks and graphs
- Dijkstra's algorithm; Prim's algorithm
- Critical path analysis
- Network flows; solving network problems using technology; use of software
- Formulating a linear programming problem, simplex method, non-standard form

**Y414 Numerical methods**

- Absolute and relative error, rounding and chopping
- Newton-Raphson iteration, method of false position, use of spreadsheets and calculators, convergence
- Fixed point iteration, relaxation
- Central difference method, error propagation by operations and by functions
- Midpoint rule, improving a solution
- Trapezium rule, Simpson's rule and the relationship between these methods
- Lagrange's form of the interpolating polynomial in context

**Y415 Mechanics b**

- Oblique impact
- Modelling circular motion with non-uniform speed
- Extension of an elastic string
- Centre of mass
- The equation of the path of a particle in 2 dimensions
- Forming 2<sup>nd</sup> order differential equations, simple harmonic motion

**Y416 Statistics b**

- The probability density function of a continuous random variable
- The cumulative distribution function of a continuous random variable
- Linear combinations of independent Normal random variables in context
- Distribution of the sample mean; simulation of random variables
- Confidence intervals using the  $t$ -distribution
- Hypothesis testing for a mean using the Normal distribution
- Hypothesis testing for an average

**END OF ADVANCE INFORMATION**

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