

## Advance Information for Summer 2022

### A Level

### Further Mathematics A

### H245

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

- 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.
- 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.
- Students and teachers can discuss this advance information.

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

**Y540/01 Pure Core**

- Mathematical induction
- Complex numbers: solution of equations; Argand diagram; loci
- Roots of unity
- Matrices: multiplication; solution of simultaneous equations; determinants; inverses
- Vectors: equation of a straight line
- Partial fractions; improper integrals; further integration
- Volumes of solids of revolution; hyperbolic functions
- Polar coordinates; area
- Differential equations: solving linear systems

**Y541/01 Pure Core**

- DeMoivre's theorem; Euler's formula
- Matrices: inverses; determinants; linear transformations; solution of simultaneous equations
- Vectors: equation of a straight line; intersections
- Vectors: equation of a plane; shortest distances
- Roots of equations
- Partial fractions; method of differences
- Summation of series
- Hyperbolic functions; identities; solution of equations
- Polar coordinates; properties of curves
- Differential equations: simple harmonic motion; modelling

**Y542/01 Statistics**

- Probability distributions for general discrete random variables
- Geometric distribution
- Poisson distribution
- Continuous random variables; probability density functions
- Linear combination of random variables
- Hypothesis tests; central limit theorem
- Chi-squared tests; fitting a theoretical distribution
- Non-parametric tests
- Hypothesis tests using Pearson's product-moment correlation coefficient; pmcc

**Y543/01 Mechanics**

- Dimensional analysis
- Work done by a force; power; energy
- Power; kinematics
- Linear momentum and impulse in two dimensions; restitution
- Impulse-momentum principle; work-energy principle
- Centre of mass by integration; rigid bodies
- Motion in a vertical circle and freefall; conservation of energy
- Linear motion under a variable force; impulse

**Y544/01 Discrete Mathematics**

- Mathematical preliminaries: arrangement and selection problems
- Graphs and Networks: complete graphs; bipartite graphs; planar graphs
- Using graphs and networks to model problems
- Network algorithms; order of an algorithm; efficiency and complexity
- Decision making in project management: critical path analysis
- The simplex algorithm: use a simplex tableau
- Game Theory: pay off matrix; pure strategies; mixed strategies; Nash equilibrium

**Y545/01 Additional Pure Mathematics**

- Recurrence relations: setting up and solving recurrence systems; modelling
- Fibonacci numbers; recurrence relations
- Divisibility tests; prime numbers; Euclid's lemma; finite arithmetics
- Prime numbers; finite arithmetics
- Groups: properties of groups; abstract groups; order of elements
- Vector product
- Reduction formulae; arc lengths
- Surfaces and partial differentiation
- Partial differentiation; tangent planes

**END OF ADVANCE INFORMATION**

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