Pearson Edexcel Level 3 GCE

May–June 2022 Assessment Window

Syllabus reference	9FM0

Further Mathematics
Advanced
Advance Information

You are not permitted to take this notice into the examination.
This document is valid if downloaded from the [Pearson Qualifications website](website).

Instructions

- Please ensure that you have read this notice before the examination.

Information

- This notice covers all examined components.
- The format/structure of the assessments remains unchanged.
- This advance information details the focus of the content of the exams in the May–June 2022 assessments.
- There are no restrictions on who can use this notice.
- This notice is meant to help students to focus their revision time.
- Students and teachers can discuss advance information.
- This document has 6 pages.

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General advice

- In addition to covering the content outlined in the advance information, students and teachers should consider how to:
  - manage their revision of parts of the specification which may be assessed in areas not covered by the advance information
  - manage their revision of other parts of the specification which may provide knowledge that helps with understanding the areas being tested in 2022.

- For specifications with synoptic assessments, topics not explicitly given in the advance information may appear, e.g. where students are asked to bring together knowledge, skills and understanding from across the specification.

- For specifications with optional papers, students should only refer to the advance information for their intended option.

- For specifications with NEA, advance information does not cover any NEA components.

A link to the Joint Council for Qualifications guidance document on advance information can be found on the Joint Council for Qualifications website or here.

Advance Information

Subject specific section

- For each paper, the lists below show the major focus of the content of the exams.

- Questions will be drawn from one or more of these areas of the specification content.

- The aim should still be to cover all specification content in teaching and learning.

- The information is presented in approximate specification order and not in question order.

Paper 9FM0/01 Further Mathematics Core Pure 1

- Complex numbers: Multiplication and division, conjugates
- Complex numbers: Roots of polynomial equations, Argand diagram
- De Moivre's theorem; Volumes of revolution
- Matrices: Inverse of a 3×3 matrix, singular and non-singular
- Method of differences for summation of finite series
- Improper integrals; Hyperbolic functions
- Integration; Partial fractions
- Inverse hyperbolic functions
- Solution of first order differential equations
- Solution of second order non-homogenous differential equations

Paper 9FM0/02 Further Mathematics Core Pure 2

- Proof by induction; Use matrices to represent linear transformations in 2-D
- Complex numbers: Multiplication and division
- Complex numbers; Addition and subtraction; simple loci in the Argand diagram
- Matrices: Solution of three simultaneous equations
- The relationship between roots and coefficients of polynomial equations
- Differentiate inverse trigonometric functions
- Vectors; Equation of a straight line, scalar product, perpendicular distance from a point to a plane
- Polar coordinates: Area enclosed by a curve, tangents
- Differentiation of hyperbolic functions; Maclaurin series

Paper 9FM0/3A Further Pure Mathematics 1

- t-formulae
- Taylor series, limits, L'Hospital's Rule
- Differential equations reducible by means of a given substitution
- Coordinate systems: Ellipse and hyperbola
- Coordinate systems: Rectangular hyperbola
- Vector product
- Vector equations of planes
- Numerical solution of first order differential equations
- Algebraic inequalities and inequations including the modulus sign

Paper 9FM0/3B Further Statistics 1

- Discrete probability distributions (mean and variance)
- Geometric and negative binomial distributions
- Hypothesis tests; Poisson approximation
- Central Limit Theorem
- Chi squared test (goodness of fit, binomial)
- Probability generating functions
- Type I and Type II errors

Paper 9FM0/3C Further Mechanics 1

- Impulse-momentum in 1-D
- Impulse-momentum in 2-D
- Power
- Work-energy
- Hooke's law, work energy
- Successive direct impacts
- Oblique impact of two spheres
- Successive oblique impacts

Paper 9FM0/3D Decision Mathematics 1

- Bin packing
- Sorts; Flow charts
- Dijkstra's algorithm; Shortest inspection route around a network.
- Floyd's algorithm; Nearest neighbour algorithm
- Critical Path Analysis including Gantt charts and resource histograms
- Formulating and using Simplex to solve a linear programme
- Big-M method

Paper 9FM0/4A Further Pure Mathematics 2

- Groups
- Reduction formulae
- The area of a surface of revolution
- Cayley-Hamilton theorem
- Further loci and regions in the Argand diagram (circle)
- Further loci and regions in the Argand diagram (arc of a circle)
- The Euclidian algorithm; Solution of congruence equations; Bezout's identity
- Permutations and combinations; Divisibility tests; Modular arithmetic
- The solution of second order recurrence relations to obtain a closed form
- First order recurrence relations, proof by induction of closed forms

Paper 9FM0/4B Further Statistics 2

- Least squares linear regression; Residuals; correlation coefficient
- Continuous probability distributions (median and mode); Cumulative distribution function
- The continuous uniform (rectangular) distribution (extension to $E(g(X))$)
- Distribution of linear combinations of independent normal random variables
- Unbiased estimators and quality of estimators
- Hypothesis test for two means (variances known); Confidence intervals
- Hypothesis test for difference between two means
- Hypothesis test for equal variances; confidence interval for variance

Paper 9FM0/4C Further Mechanics 2

- Uniform motion in a horizontal circle
- Motion in a vertical circle
- Centre of mass (discrete mass distribution)
- Centre of mass, equilibrium (lamina)
- Centre of mass, equilibrium (framework)
- Centre of mass of a non-uniform body, equilibrium
- Simple harmonic motion
- Dynamics, variable acceleration

Paper 9FM0/4D Decision Mathematics 2

- Transportation problems: Stepping stone method, linear programming representation, north-west corner method
- Hungarian algorithm
- Flows in networks to include maximal flow and cuts
- Dynamic programming; Table format
- Game Theory; Conversion to a linear programme for Simplex, play-safe strategies, dominance
- Formulating and solving a first order recurrence relation
- Second order recurrence relations
- Use, construct and interpret decision trees

END OF ADVANCE INFORMATION