Cambridge Assessment

A Level

Mathematics

Session: 1957
Type: Syllabus
Code: 19

G.C.E. Mathematics (Advanced Level)
Oversea H.S.C. Mathematics (Principal Subject)

There will be three papers (each $2\frac{1}{2}$ hours). Candidates must not give up answers to more than eight questions in each of these papers.

Mathematics I: **Algebra** and **Trigonometry** (10 questions).
Mathematics II: **Geometry** and **Calculus** (10 questions).
Mathematics III: **Mechanics** (10 questions), **Statistics** (4 questions).

For syllabuses, see pp. 13–15.

Successful candidates in the subject Mathematics will normally be certified as having passed in Mathematics (G.C.E. Advanced or H.S.C. Principal Subject), but candidates who are weak in Paper III may be certified instead as having passed in Pure Mathematics* if they do sufficiently well in Papers I and II taken together. Similarly, candidates who enter for Mathematics and Paper III of Further Mathematics (either as a single paper or as part of that subject) may, if they do sufficiently well in Mathematics III and Further Mathematics III, be certified as having passed in Applied Mathematics* and for this purpose the paper Further Mathematics III will contain a number of questions marked with an asterisk. Candidates who have passed in Mathematics or Pure Mathematics at a previous examination may re-enter for Paper III together with Paper III of Further Mathematics; if they pass in the two papers taken together, they will be certified as having passed in Applied Mathematics.

G.C.E. Mathematics (Scholarship Level)

Candidates must offer Mathematics IV (3 hours) in addition to papers Mathematics I, II and III above. At least half of this paper will be based upon the syllabus for these three papers. For syllabus, see p. 15.

* For the exemption requirements of London University, see p. 24.

DETAILED SYLLABUSES

G.C.E. MATHEMATICS (ADVANCED LEVEL)
OVERSEA H.S.C. MATHEMATICS (PRINCIPAL SUBJECT)

(see also p. 4)

For the significance of *italics* see above.

MATHEMATICS I

Algebra

Indices, logarithms, surds. The remainder theorem.

Progressions, including sum to infinity.

Simple problems on arrangements and on choice and chance. Binomial theorem for a positive integral index. (Questions on the greatest term and on sums and properties of the coefficients will not be asked.) *Use of the series for* $(1+x)^n$ *when n is non-integral. Simple approximations.*

Solution of simultaneous linear equations involving not more than three unknowns. Simultaneous equations, one linear, in two unknowns.

Elementary properties of quadratic equations and functions. Locating the roots of an equation by the use of simple graphical methods.

Trigonometry

Circular measure. Trigonometrical ratios of angles of any magnitude. Applications to projection. Graphs of simple trigonometrical functions. *Formulae for sin* $(A \pm B)$, *cos* $(A \pm B)$, *tan* $(A \pm B)$; *applications to multiple angles and simple identities.* Easy trigonometrical equations (excluding $a \cos x + b \sin x = c$).

Solution of triangles; determination of area. Easy three-dimensional problems.

MATHEMATICS II

Geometry

Elementary two-dimensional co-ordinate geometry, e.g. distances, angles, area of a triangle.

The linear equation; perpendicular distance from a point to a line. Easy locus problems (rectangular Cartesian co-ordinates only). Equation of a circle. Simple curve-tracing.

Elementary treatment of the loci $(ct, c/t)$, $(at^2, 2at)$, $(a \cos t, b \sin t)$, including their Cartesian equations, chords, tangents, normals. Focus-directrix and simple associated properties of the parabola. (Any recognised treatment of these curves will be accepted, but all questions set will be soluble by analytical methods.)

Calculus

Graphs and derivatives of simple algebraic, trigonometrical, exponential and logarithmic *functions* (*including sums, products, quotients, functions of a function and implicit functions but excluding the inverse trigonometrical functions*). Applications to tangents and normals, sketch-graphs, kinematics, rates of change, small increments (one variable only). The approximate solution of equations, e.g. by Newton's method. Maxima and minima.

Simple expansions, e.g. $\sin x$, $\log (1+x)$, e^x, $(1+x)^n$.

The definite integral and its representation as an area; integration as the inverse of differentiation, including *integration by simple change of variable* and by use of partial fractions. (*Integration by parts is excluded.*) Applications to areas and volumes, and centres of gravity.

MATHEMATICS III

Mechanics

Kinematics of a particle moving in a straight line.

Composition and resolution of velocities and accelerations; relative velocity.

Composition and resolution of forces; moments. (An experimental basis is sufficient. Proofs of the fundamental theorems of statics will not be required.) Centre of gravity. Equilibrium of a particle and of a rigid body under coplanar forces.

Friction. Hooke's Law. Simple machines.

Projectiles.

Newton's laws of motion and the ideas of mass, force, momentum, impulse, energy, work, power. Absolute units. The conservation of momentum in rectilinear motion. Conservation of energy.

Simple harmonic motion. Small oscillations of the simple pendulum. Uniform motion in a circle.

Statistics

As printed for G.C.E. Additional Mathematics (Ordinary Level), or for Oversea H.S.C. Mathematics (Subsidiary) on p. 13, with the addition of:

Proof of the formula $\sigma/\sqrt{n}$ for the standard error of a mean.

Elementary ideas of association. Scatter diagrams, leading to the ideas of linear regression and correlation. The calculation of correlation coefficients. The equations of regression lines, including use of assumed mean in calculating product moment.

G.C.E. MATHEMATICS (SCHOLARSHIP LEVEL)

MATHEMATICS IV

The syllabus for Mathematics I, II and III above, together with the topics in *italics* in the syllabus for Further Mathematics. See p. 16.