CORRESPONDENCE

To the Editor of the *Mathematical Gazette*.

Dear Sir,

It has been suggested that your readers might like to have some information about recent and forthcoming changes in the Mathematical Tripos in Cambridge.

The formal structure of the Tripos remains unchanged. The normal degree course consists of Part I (one year's work) followed by Part II (two years' work). A student who gets Honours in Part II is awarded the degree of B.A. provided that he spends three years in study in Cambridge. Those who do sufficiently well in Part II mathematics may be allowed to stay on for a fourth year to take Part III mathematics, one of the diplomas (in Statistics or in Numerical Analysis and Automatic Computing), or perhaps a part of another Tripos (usually Part II of either the Natural Sciences Tripos or the Mechanical Sciences Tripos). In practice, this is an essential preliminary to research. It has been and will remain possible for particularly well-prepared and gifted students to omit Part I altogether, taking Part II at the end of the second year and Part III (or some other examination) at the end of the third. However, the new changes are likely to reduce the number of candidates who can take this "fast course". There is a third class of student: those who take Part I only and then move over to another Tripos—Natural Sciences, Economics, etc. The Mathematical Tripos will continue to be the main avenue for those who wish to study mathematical physics, both classical and modern, as well as for those whose interest is in mathematics for its own sake.

A completely revised syllabus of work is being introduced gradually: the new syllabus in Part I is being used fully this year for the first time, the new form of the first year of Part II will be complete in October 1963, and so on. All the courses for Part I and for the first year of Part II are compulsory The courses in the second Part II year, on the other hand, are optional. The candidate will be expected to have attended a specified number of lectures, and sufficiently many options will be provided in the second year of Part II to allow him, if he wishes, to specialise entirely in pure mathematics or entirely in mathematical physics. It is hoped that the range of options, which will include a course on statistics, one on numerical analysis, and possibly one on the History of Mathematics, will cater both for those for whom Part II is the end of their mathematical education and for those going on to Part III. The arrangements for Part III (where the student can specialise in a particular branch of pure mathematics or mathematical physics) are unaffected by the present reform.

The most considerable changes being made at the moment are in Pure Mathematics. The courses for Part I and the first Part II year now form part of a continuous sequence. Previously there was some repetition for the benefit of the fast course student; the elimination of this permits the adoption of a more deliberate pace. The material is organised into eight courses, four in analysis and four in algebra. The analysis has been mildly modernised, for example by the introduction of

topological ideas, but perhaps the most striking change in it is that the foundations of analysis no longer appear in the compulsory course, which takes it as an axiom that a bounded set of real numbers has a least upper bound. Instead, there is to be an optional course in Foundations in the second Part II year. The major change in pure mathematics is, however, the increased emphasis on algebra and the elimination of geometry (as a separate discipline) from the compulsory mathematics syllabus. In the Part I year there is a course on real Euclidean space as a vector space and one on groups. In the second year there is a treatment of rings and fields, of abstract vector spaces, bilinear forms, etc., and then a brief introduction to algebraic geometry (Euclidean, projective and affine). The optional courses for the second Part II year are still under discussion.

Extensive changes in the syllabuses for courses in mathematical physics have already been made. There is now a much greater emphasis on the physical background of the subjects treated, and physical understanding is regarded as being as important as mathematical manipulation. The range of physical subjects is greater, and in Part II there are now courses on kinetic theory, elasticity, fluid dynamics, relativity, thermodynamics, statistical mechanics and quantum theory, as well as on the more conventional subjects such as classical dynamics, gravitation and electricity, and magnetism. The general plan in mathematical physics is to treat several basic topics in Part I and again, at a higher level of sophistication and in a wider context, in the first Part II year Consequently, mathematical physics probably does not present as much difficulty to the fast course student as pure mathematics.

A new feature is that in Part I there are (compulsory) courses in Statistics and in Digital Computing. These subjects are of increasing importance in a wide range of activities, and the courses should be particularly useful to those leaving mathematics after Part I for another subject. No knowledge of these courses is presupposed in Part II, and their existence need not embarrass those taking the "fast course".

There are also the usual "mathematical methods" courses at all levels of Part I and Part II. These are concerned with standard techniques and topics such as vector and tensor analysis and elementary differential equations, which are indispensable for applied mathematics and which are not appropriate for treatment as a part of Pure Mathematics at this level. Heuristic treatments are given which relate the mathematical methods to the use to be made of them. With the growing abstraction of pure mathematics and the trend towards more physical content of mathematical physics, it is likely that these courses will increase in importance.

Yours sincerely,
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