QUESTIONS IN PURE MATHEMATICS PROPOSED AT THE B. A. AND B. SC. PASS AND HONOURS EXAMINATIONS OF THE UNIVERSITY OF LONDON. WITH COMPLETE SOLUTIONS

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UNIVERSITY OF LONDON.

WITH

COMPLETE SOLUTIONS

BY

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PREFACE.

THE main object of this book is to afford help to those students who have to read Mathematics for the B.A. and B.Sc. degrees of the University of London without the aid of a private tutor. Its appearance is due to the suggestion of my friend Mr. E. M. LANGLEY, Mathematical Master in the Bedford Modern School; and it was originally intended to be our joint production. The pressure of other duties has prevented Mr. LANGLEY from carrying out his part of the work; and though I am much indebted to him for his advice and criticism, he is not responsible for any thing in the present volume beyond his solution of Question 9, page 17, which I have substituted for my own.

In the various divisions of the book I have tried to adapt the methods employed to the standard that a student may be expected to have reached at the corresponding point of his, or her, course. It therefore happens, particularly in the earlier papers, that the solutions chosen are

not always the shortest, but such as, I venture to think, would either present the subject of the question most clearly to the student, or would supplement some better-known methods.

I have tried to reduce the number of books of reference, as far as possible, by choosing *one* in each subject for general use. It thus happens that a piece of "book work" which is to be found in some text-books, but not in those adopted throughout, has been occasionally embodied in the text of this volume.

I have to express my thanks to Mr. J. W. CAPSTICK, B.A., for his careful correction of several of the earlier proof-sheets.

J. E. A. STEGGALL.

The Owens College, Manchester,
July 27, 1882.

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LIST OF BOOKS
REFERRED TO IN THIS WORK.

I. GENERAL REFERENCE.

TODHUNTER, I.
- Euclid.
- Algebra for Colleges and Schools.
- Plane Trigonometry.
- Spherical Trigonometry.
- Theory of Equations.

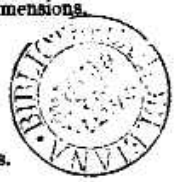
BESANT, W. H.
- Geometrical Conic Sections.

WILSON, J. M.
- Solid Geometry and Conic Sections.

SALMON, G.
- Higher Algebra.
- Conic Sections.
- Higher Plane Curves.
- Geometry of Three Dimensions.

WILLIAMSON, B.
- Differential Calculus.
- Integral Calculus.

BOOLE, G.
- Differential Equations.



II. OCCASIONAL REFERENCE.

DREW, W. H.
- Geometrical Conic Sections.

TODHUNTER, I.
- Differential Calculus.

BOOLE, G.
- Finite Differences.

CAYLEY, A.
- Elliptic Functions.

ERRATA.

Page 45, Qu. 11: *for* $P_1 Q_1 R_1$ *read* P, Q, R.

„ 160, line 3 from bottom: for $u-iy$ read $u-iv$.

In the names of Examiners, pp. 106, 117, 124, 137:

for Rev. Prof. Townsend, M.A., F.R.S.,

read Benjamin Williamson, Esq., M.A., F.R.S.