THE PUPIL-TEACHER'S COURSE OF MATHEMATICS. PART I. EUCLID, BOOKS I. & II. WITH NOTES, EXAMPLES, AND EXPLANATIONS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649524167

The Pupil-Teacher's Course of Mathematics. Part I. Euclid, Books I. & II. With Notes, Examples, and Explanations by Anonymous

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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Trieste

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LONDON: PRINTED BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE
AND PARLIAMENT STREET

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PART I.

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Notes, Examples, and Explanations.

BY

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LONDON:
NATIONAL SOCIETY'S DEPOSITORY,
WESTMINSTER.
1879.

PREFACE.

I HAVE long thought that a course of Mathematics for Pupil-teachers, covering the ground they are required to traverse, with hints and notes on points at which beginners find a difficulty, is urgently needed. Their course includes the first two books of Euclid, Algebra to the end of quadratic equations, and the mensuration of plane surfaces, and this, the first part of the course, contains two books of Euclid. No doubt there are good editions of Euclid, but in the first place they comprehend several Books and are therefore unnecessarily bulky and expensive for pupil-teachers; in the second place, the notes and explanations are for the most part adapted to a more advanced class of students (for instance, in Pott's excellent edition), and not full enough for pupil-teachers, who have many other subjects to learn at the close of days devoted to teaching; and again, many of the examples (deductions) are too hard for them and are not graduated sufficiently. I have examined for the Oxford and Cambridge Board, the Cambridge Syndicate, &c., a large number of our great public and middle-class schools, and have also awarded the certificates of the Board in Mathematics, and it is surprising how frequently the same errors and a similar confusion of ideas recur: against these I have endeavoured to guard in the notes and hints. It is an important question in editing a treatise on geometry, whether abbreviations may be allowed. I have followed our rule at the Cambridge Local Examinations, that, whilst no symbols *of operation* (such as $-$, $+$, $\times$) are admissible, all generally understood abbreviations for *words* may be used. The question is important, for *magnitude* not *number* is the subject of geometry, and it therefore would be contrary to strict reasoning on space to introduce symbols which refer distinctly to operations of quantity. Moreover, apart from the illogical position of such symbols in geometry, nothing so much causes a beginner to confuse together algebraical and geometrical notions as the connection of these symbols with geometrical magnitudes. But whilst I recognise the truth and importance of this, there seems no advantage in forcing a student to write out words at full length which occur several times in propositions; and I have therefore introduced abbreviations for certain words, of which a list will be given. The examples are attached to the propositions on which they respectively mainly depend: most of them have been set at examinations of schools, and several at the monthly collective examinations of pupil-teachers. The learner should by no means be satisfied with mastering the propositions: the real test of geometrical knowledge is ability to work problems, and therefore at every examination great weight is given to this point. With patience and careful thought every boy of fair ability will be able to solve many of the deductions I have given, and when he has done so, his future progress will be comparatively easy. The beginner is recommended to study thoroughly the propositions to the end of the 26th (which is the course for pupil-teachers at the end of the third year), and then to begin again, working out the *riders*, as deductions are termed when they are attached to propositions by aid of which they may be solved. A rider is therefore in one respect much easier than a deduction set as a separate and independent example, inasmuch as the student knows that the parent proposition is the key to its solution. In another point of view, however, it is more difficult, since in working it, only the parent and any of the preceding propositions may be appealed to, whereas in the case of a deduction