

**THE ESSENTIALS OF
GEOMETRY, PLANE AND
SOLID, AS TAUGHT IN FRENCH
AND GERMAN SCHOOLS**

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The Essentials of Geometry, Plane and Solid, as Taught in French and German Schools by J. R. Morell

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THE
ESSENTIALS OF GEOMETRY,
PLANE AND SOLID,

AS TAUGHT IN FRENCH AND GERMAN SCHOOLS

With Shorter Demonstrations than in Euclid ;

ADAPTED FOR STUDENTS PREPARING FOR EXAMINATION,
CADETS IN MILITARY AND NAVAL SCHOOLS,
TECHNICAL CLASSES, ETC.

By J. R. MORELL,

FORMERLY ONE OF HER MAJESTY'S INSPECTORS OF SCHOOLS.

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PREFACE.

A RESOLUTION recently passed at a Meeting of some of the principal Head Masters of schools in England has brought into additional prominence a question already strongly urged upon the attention of the nation.

The Report of the Schools' Inquiry Commission had already raised doubts as to the propriety of continuing to employ Euclid as the one authorized text-book for geometry in our public schools and Universities. The Report of the French Imperial Commissioners, published at Paris, July 1870, placed in a still more prominent light the objectionable sides of our geometrical methods¹, and the general conviction produced by these unfavourable verdicts has offered its last expression in the resolution of the meeting to which we have alluded, which urges that the Universities and teaching bodies in England be pressed to give greater freedom in the use of geometrical text-books.

Independently of the existing agitation expressing dissatisfaction with present methods in geometry, and the propriety of adopting shorter and more practical methods, a little acquaintance with the sentiments of some of our principal geometers even twenty or thirty years ago discloses the fact that Euclid had come to be viewed by many of them as a cumbrous text-book, forced into their hands for use by the rigid, traditional practice of the colleges in which they taught.

Dr. James Thomson, Professor of Mathematics in the

¹ Note A at the end.

University of Glasgow, in the Preface to the second edition of "Euclid's Elements" (Edinburgh, 1837), remarks,—

"In many instances I have endeavoured to improve the work, sometimes by abbreviations in the process of reasoning, and more frequently by the omission of needless repetitions in the language of the demonstrations. The notes and illustrations at the end of the volume, and those interspersed through the work, will point out some of the more important of the modifications above referred to. In addition to these it may be here mentioned, that considerable changes, and it is hoped improvements, have been made in the demonstrations of the 5th and 35th propositions of the First Book; in the 13th of the Second Book; in the 14th, 15th, 21st, 31st and 32nd of the Third Book; and in several in the Fourth, Sixth, Eleventh and Twelfth Books."

Again, at page 366 (Notes), in a footnote, Dr. Thomson remarks, "The study of Euclid would be rendered more easy to the beginner, if, in accordance with some of the preceding Notes, he should omit in the first reading the 44th and 45th propositions of the First Book, and all in the Second Book after the first three; then omitting in like manner the 35th, 36th, and 37th of the Third Book, and perhaps all the Fourth Book, he may proceed to the Fifth and Sixth Books; and having advanced in the latter to the 17th proposition, he may then turn back, and read what he has omitted, availing himself of the facilities that will be afforded, in several instances, by means of the Sixth Book. He might also postpone the 47th of the First Book, but Euclid's proof of it is so elegant and easy as to render this unnecessary; and it is desirable that he should be early acquainted with so important a proposition."

The above remarks are chiefly important because they show that in the estimation of Dr. Thomson the method of Euclid is inconsequent and therefore faulty, and that the demonstrations in many cases demand improvement, erring on the score of verbiage and repetition.

PREFACE.

v

We add some observations of the same author in his Supplement to Book V., where he remarks that "The theory of proportion has now been delivered in the accurate but prolix method given by Euclid. It may suit the views and convenience . . . of many teachers and learners to have its principal properties established in a more concise and condensed form, as in the following Supplement, *so as to save time which may be more profitably devoted to other researches.*"

Even Mr. Todhunter, who would greatly regret to see Euclid discarded as the sole text-book of our public schools, admits that "it cannot be denied that defects and difficulties occur in the "Elements of Euclid," and that these become more obvious as we examine the work more closely²."

As regards judgments formed of Euclid by authorities on the Continent, the writer might refer to personal conversation with the French Imperial Commissioners, when one of them informed him that in the French colleges they would not think of retaining as their text-book an ancient work, full of needless repetitions and unnecessary details of proof, consuming unprofitably much time of the student, and departing widely from the clear, elegant style of proof long since admitted in France.

Without introducing larger extracts from Mr. Arnold's Report on Education in France, we may add two passages which go far to show the estimation in which our geometrical methods are held on the Continent of Europe.

The unpractical character of our mathematical teaching was frequently criticized by the eminent men with whom Mr. Arnold spoke in France. Thus he says, "They severely criticize the Cambridge teaching for devoting itself so exclusively to pure mathematics, and making the instrument into an end. The barrenness in great men and great results

² Preface, p. viii., "The Elements of Euclid," by J. Todhunter. For the Use of Schools.

which has since Newton's time attended the Cambridge mathematical teaching is mainly due, they say, to this false tendency." A little farther on Mr. Arnold adds, "In general, the respect professed in France for the mathematical and scientific teaching of our secondary schools is as low as that professed for our classical teaching is high."

In another place we find this observation, with which we conclude our extracts: "I must not forget to add that our geometry teaching was in foreign eyes sufficiently condemned, when it was said that we still used Euclid. I am bound to say that the Germans and the Swiss entirely agree with the French on this point. Euclid, they all said, was quite out of date, and was a thoroughly unfit text-book to teach geometry from. . . . I was, of course, astonished, and when I asked why Euclid was an unfit text-book to teach geometry from, I was told that Euclid's propositions were drawn out with a view of meeting all possible cavils, and not with a view of developing geometrical ideas in the most lucid and natural manner. . . . At any rate, the foreign consensus against the use of Euclid is something striking, and I could not but call the Commissioner's attention to it²."

It is therefore evident that by a large number of competent judges, English and foreign, Euclid is regarded as an inappropriate text-book, and that a change is desired.

We proceed to offer a few additional arguments in favour of a more concise and practical text-book in geometry, and we may notice—

1st. That apart from any other reasons, the importance of saving time in this day, when the field of knowledge is so large, is not to be overlooked.

The experimental and the natural sciences have in latter years risen to such prominence that they cannot be neglected in any proper curriculum, and the recent Reports of Commissions on our Higher Education show how strongly the minds

² Schools' Inquiry Commission, 1868, vol. vi., p. 505-7.

of the Commissioners were impressed with the importance of giving a larger share of time and attention to them.

Accordingly, it is of the first importance to save time in education, when this can be done without any material disadvantage to each special study and to the general development of the faculties; and in the case of the shorter kinds of demonstration, in use in all the best French and German schools, it may be remarked, that they tend to produce clearness and precision, which are in some degree impeded by the wordiness and repetition of Euclid⁴.

2ndly. It is admitted that the art of war, in this age, makes continually greater demands on the scientific training of officers.

Not only the engineer and artillery branches require rigid and accurate scientific training, but it is felt that the whole body of officers require a due preparation in those departments of science that have a direct bearing on their profession. It is needless to dwell on the national importance of this training, after witnessing the unparalleled success of the scientifically trained officers of the Prussian army. But it is equally evident that the excellent school of logic found in the wordy proofs of Euclid is here quite out of place. The great body of military officers require short, lucid, rapid demonstrations and practical application of theorems and problems. And here the kinds of proof and general methods in vogue in Germany and France are far better adapted than ours to secure the end in view, especially as they have furnished a number of excellent manuals and digests purposely intended to initiate students rapidly in the more essential parts of mathematical science, and particularly of geometry.

It is an attempt to produce a manual or memento of this kind that is now offered, not only for the use of military and

⁴ On "The Unsuitableness of Euclid as a Text-book of Geometry," by the Rev. J. Jones, Head Master of King William's College, Isle of Man, p. 31.