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BY

JOHN CASEY, LL.D., F.R.S.,

Fellow of the Royal University of Ireland;
Member of the Council of the Royal Irish Academy;
Member of the Mathematical Societies of London and France;
Corresponding Member of the Royal Society of Sciences of Liege; and
Professor of the Higher Mathematics and Mathematical Physics
in the Catholic University of Ireland.

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PREFACE.

I HAVE endeavoured in this Manual to collect and arrange all those Elementary Geometrical Propositions not given in Euclid which a Student will require in his Mathematical Course. The necessity for such a Work will be obvious to every person engaged in Mathematical Tuition. I have been frequently obliged, when teaching the Higher Mathematics, to interrupt my demonstrations, in order to prove some elementary Propositions on which they depended, but which were not given in any book to which I could refer. The object of the present little Treatise is to supply that want.

The following is the plan of the Work. It is divided into five Chapters, corresponding to Books I., II., III., IV., VI. of Euclid. The Supplements to Books I.–IV. consist of two Sections each, namely, Section I., Additional Propositions; Section II., Exercises. This part will be found to contain original proofs of some of the

most elegant Propositions in Geometry. The Supplement to Book VI. is the most important; it embraces more than half the work, and consists of eight Sections, as follows:—I., Additional Propositions; II., Centres of Similitude; III., Theory of Harmonic Section; IV., Theory of Inversion; V., Coaxal Circles; VI., Theory of Anharmonic Section; VII., Theory of Poles and Polars, and Reciprocation; VIII., Miscellaneous Exercises. Some of the Propositions in these Sections have first appeared in Papers published by myself; but the greater number have been selected from the writings of CHASLES, SALMON, and TOWNSEND. For the proofs given by these authors, in some instances others have been substituted, but in no case except where by doing so they could be made more simple and elementary.

The present edition is greatly enlarged: the new matter, consisting of recent discoveries in Geometry, is contained in a Supplemental Chapter. Several of the Demonstrations, and some of the Propositions in this Chapter, are original, in particular the Theory of Harmonic Polygons, in Section VI. A large number of the Miscellaneous Exercises are also original.

In collecting and arranging these additions I have received valuable assistance from Professor NEUBERG, of the University of Liege, and from M. BROCARD (after whom the Brocard Circle is