

## PREFACE.

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THE geometry of Euclid is deductive. Yet the processes of all sciences, other than pure mathematics, involve both induction and deduction. All the knowledge which we have of life, with its varied phenomena, is reached by induction and deduction. Any science, then, which permits the student, from a number of observations, to reach a general result, and again from such generalization to draw conclusions, must have distinct educational value. The present little book is an attempt to make the processes of elementary geometry both inductive and deductive. I feel that in making this attempt I am adapting the study of Geometry to immature minds. The mind of youth receives its knowledge in the form of isolated facts; it is for the educator to point out that isolated facts fall into groups and may be crystallized into general conclusions. Special opportunities present themselves in elementary geometry for following this method. Thus, if a number of triangles be accurately constructed with bases of 45 millimetres and angles at the bases  $75^\circ$  and  $62^\circ$ , by actual measurement the learner finds that all the sides opposite to the angles of  $75^\circ$  are equal, and likewise those opposite to the angles of  $62^\circ$ , and that the remaining angles of the triangles have the same magnitude. Analogous constructions and measurements being repeated in a number of cases, the learner, as a matter of inductive observation, feels himself justified in making the generalization expressed in the enunciation of Euclid I., 26. In the process the intellectual interest and curiosity of the pupil are excited, and in reaching the conclusion he feels almost as if he had made the discovery himself. If, subsequently, geometrical forms are presented to him where he can utilize his previous conclusion, he feels with keenness the value of his previous work. He has, in fact, been going through the process of induction and deduction,—the process through which every scientific discoverer goes—with, in miniature, the emotions of the investigator.