

CORRESPONDENCE.

TO THE EDITOR OF THE *Mathematical Gazette*.

DEAR SIR,—I was pleased to read the letter from Dr. Sommerville in the last number of the *Mathematical Gazette*. The new point which Dr. Sommer-ville raises in reference to the proof of Desargues' Theorem is a matter of general interest to those who have studied or written on Projective Geometry, and involves the question how far it is justifiable to combine different methods of treating the subject. The more important theorems may be deduced by at least five different methods: (1) by conical projection, wherein the theorems for the conic are deduced from those for the circle; (2) by the analogous method of homology or plane perspective; (3) by the use of ratios and anharmonic properties involving the idea of the ratios of lengths—in this method Ceva's, Menelaus' and Carnot's theorems are of primary importance; (4) by using the anharmonic properties of ranges and pencils to prove directly the properties of conics; (5) by commencing with certain fundamental axioms and developing the subject independently of the results obtained by Euclidian geometry. The point at issue is how far it is justifiable to combine these different methods. The natural instinct of a writer acquainted with the subject is to write distinct sections dealing with the subject from these different points of view. But the question arises whether this is the best way of presenting the subject to the learner—and it is for the learner that the majority of mathematical books must be written. After careful consideration I came to the conclusion that it was desirable to follow in the steps of Professor Cremona and more or less combine the different methods of treating the subject. For the learner, as a general rule, the easiest method is the best, and the time available for the study of Pure Geometry in the career of a student for mathematical honours is so limited that an independent consideration of the subject of projective geometry from every point of view is impossible. The only practical method for placing the different points of view before the student seems to me to lie in supplying alternative proofs of the more important theorems illustrating the different methods. To confine the attention of the student to one of these would limit too much his view, and would render him unable to approach many problems which, considered from another point of view, present little or no difficulty. It should be borne in mind that theorems involving the ratios of distances are just as much projective as those relating to the concurrency of straight lines, etc. On the ground that new axioms should be introduced only when they cannot be dispensed with, I have abstained from their introduction till treating of one to one geometrical correspondence.—I am, Yours truly,

JOHN L. S. HATTON.

East London College (University of London),
3rd May, 1915.

DEAR SIR,—A correspondent sent me some time ago a suggestion concerning the proofs given in my Tract, *The Integration of Functions of a Single Variable*, of the fundamental theorem concerning unicursal curves. The suggestion referred to the case in which some of the singular points are ordinary cusps. I took note of the suggestion and wish to incorporate it in a new edition of the Tract. But I have unfortunately lost the letter, and am unable to remember to whom the suggestion is due. I should be much obliged if my correspondent would communicate with me again, if he should happen to see this note.—

Yours truly,

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