

reasons given above, very limited. When I called it a "bastard" derivative of quaternions, I meant that it was the progeny of quaternions, but not in the legitimate line of succession and evolution.

I am, etc., E. T. WHITTAKER.

#### THE RESEARCH METHOD IN TEACHING MATHEMATICS.

To the Editor of the *Mathematical Gazette*.

SIR,—Miss Knowles reminds us of one of the distinguishing advantages of mathematics as a school subject, namely that it is something for a boy to do, rather than something he must learn. This advantage is shared by carpentry, music and drawing, by English if it is taught the right way, and to a more limited extent by foreign languages.

The Spens Committee have missed this vital point, for they seek to reduce the time allowed for the subject, at the same time increasing the field to be covered. They recommend a more descriptive treatment. In other words they would have it become the kind of subject that can be taught by dictating notes, a "crammable" subject, a thing to learn, not a thing to do.

It is significant that "general science" is considered a good choice for a not very able boy who wishes to pass his School Certificate examination.

Yours faithfully, E. H. LOCKWOOD.

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1357. He (the Archbishop's grandfather) goes to Cambridge for study in 1780, but writes in his diary: "The libraries of Cambridge not well supplied with books: no studies in any credit there but mathematical ones." (p. 10.)

1358. She (the Archbishop's mother) taught arithmetic, with very little knowledge of arithmetic herself, by steady repetition. She had a key to the sums in the arithmetic book, giving the answers. If a sum was brought to her and the answer was wrong, she drew her pencil through it and made no further remark. It had to be done again till it was done right. The sum of today was repeated tomorrow, and so on, until perfect accuracy was obtained.—(From a Memorandum by the Archbishop's sister.) (p. 17.)

1359. Euclid was the same. She (his mother) did not understand a word. He began to do so as he advanced in the subject, and could substitute one expression for another, or change the order of letters. She interposed and corrected him. He would reply impatiently "It was all the same." "Say it", she ordered, "precisely as it is here," touching the book.—(From Memorandum by the Archbishop's sister.) (p. 18.)

1360. . . . The Archbishop told him that on his ninth birthday, to the best of his recollection, after he had gone to bed, his mother happened incidentally to mention to his father that she had carried out his orders to teach the boy Euclid, and that he knew his Euclid. "What! all of it? Can he say any proposition?" "Yes, he knows it all." The father, naturally disbelieving this, had the child woke up, when he repeated, sitting in bed, a long proposition." (p. 18.)

Gleanings 1357-1360 from *Memoirs of Archbishop Frederick Temple*, I. [Per Mr. A. F. Mackenzie.]