(and in this case of different dimensions, even) can ever be considered to have clarified the presentation. In Britain, it would only accumulate a wealth of trouble for future work in mechanics and differential geometry, where our syllabus requires an easy familiarity with transformations of the type $s = a\theta$, $v = \dot{s} = a\dot{\theta}$, etc. The formulation this writer wishes us to adopt is, in fact, almost as pernicious as the definitions of the trigonometric functions used by some American writers, who draw a circle of unit radius and *define* their circular functions as *lengths*!

Yours etc., ROGER F. WHEELER

Hymers College, Hull

THE DEFINITION OF A LOCUS

To the Editor of the *Mathematical Gazette*

DEAR SIR,

Mr. Wheeler's criticism (*Gazette*, XLII, 61) of the too-prevalent kinematical account of loci (not 'dynamic,' surely, even in Clifford's idiom) is well directed, and it can only strengthen his case to protest that his definition of a locus has been orthodox for a very long time.

It is not quite the original definition, for in the Greek the stress when the new word was introduced seems to have been on the theorem, not on the set of points identified in the theorem. The locus classicus, so to speak, is a sentence in the *Commentaries* of Proclus. The first English translation, by Thomas Taylor in 1792, runs (Vol. II, 177) "I call those (theorems) local, to which the same symptom happens in a certain place." Few of us would interpret this sentence with any confidence, even with the help of an entry in Thomas Walter's *Mathematical Dictionary*, 1762; "Local problem, such a problem as is capable of an infinite number of solutions, and all different." But Heath in his *Euclid*, 1908 (vol. I, 329) gives us an intelligible version, "I call those (theorems) locus-theorems in which the same property is found to exist on the whole of some locus," thus claiming in effect that the idea of a locus as a propertied class is classical.

This is not to suggest that this idea had the same generality long ago as it has to-day. Until recently there has always been a tacit assumption that only relations of certain kinds were recognized in polite society To L'Hôpital and Maclaurin in the first half of the 18th century, for example, dazzled by the invention of coordinates, a locus is the locus *of an equation*. Again, in the sentence "To every property in relation to each other which points can have, there corresponds some locus, which consists of all the points possessing the property," A. Whitehead in his *Introduction to Mathematics*, 1911 (p. 121), seems to be making no reservations, and it is a shock to find him in the preceding sentence asserting

that a (plane) locus is a *curve*. Is not $AO^2 + BO^2 < \frac{1}{2}AB^2$ a property of the variable point O in relation to the fixed points A, B?

In the Association's Geometry Report of 1923 the emphasis is different, and the writers take for granted that they are using familiar language in saying (p. 63) "The locus that corresponds to a prescribed set of conditions is both inclusive and exclusive, including every point which satisfies the requirements, excluding every point which does not." The Report gives examples of loci which can not be specified by equations or described by moving points. "Such loci enliven the class-room."

Teachers' blunders necessarily tend to perpetuate themselves, and I hope Mr Wheeler will continue his campaign. The *Encyclopaedia Britannica* and the *Concise Oxford Dictionary* can be quoted against him, but there is some ground for hope. It is by way of crosswords that most of us extend our vocabulary nowadays, and *Chambers* must have the last word. "Locus: (*math.*) the line or surface constituted by all positions of a point or line satisfying a given condition."

Yours etc., E. H. NEVILLE

UNSOUND EXAMINATION QUESTIONS

To the Editor of the *Mathematical Gazette*

DEAR SIR,

Until 1937, "The Mathematical Gazette" had a feature called "The Pillory" in which unsound mathematical questions set in public examinations were shown. Then, a member who found such a problem knew what to do. He simply sent the question to the Editor, with or without comment. Now, as then, he may first ask the problem bureau for a solution, but it is not clear what is to be done next.

The Joint Four Secondary School associations send an annual questionnaire on G.C.E. exams to schools, and any criticisms of the papers, including accusations of unsoundness, are best made in this way In College Entrance Scholarship examinations, the proportion of unsound questions is greater than in G.C.E., and the colleges may receive a stream of letters about these mistakes. It would be helpful if there were some way in which *one* official protest could be made against every unsound question.

No one knows better than the examiner who has tried to clear up the mess after a dud question, that such things should not reach the candidates. The examiner himself must not be blamed, any more than the printer. The examining body should organise itself so as to minimise the chance of an unsound question's being overlooked. Examining bodies whose record is bad should try to