

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

UNSOOUND 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

get advice from those who are more reliable. It is not a question of mathematics, but one of statistics and psychology.

It might be interesting to attempt a classification of unsoundness, from the obvious misprint to the hopelessly obscure question, but it would be difficult. To conclude, here are three examples of rather unusual types. An ambiguous question, set to candidates for Science scholarships: A uniform rod of length $2a$ hangs, in a horizontal position by two light vertical strings of length b . Find the period of small oscillations.

A well-known result that is difficult to prove, also set to candidates for Science scholarships:

Prove that the solid which has the greatest volume for a given surface area is a sphere.

Set in London Inter. (Eng.), a question with too much data. This contained seven incompatible measurements, any six of which would give an answer, so that the seven answers were different. Other "correct" answers could be obtained by using all the data in various ways. This sort of question does not worry a candidate unless he has time to check his results, but is interesting to mark.

Yours etc., G. A. GARREAU

To the Editor of the *Mathematical Gazette*

DEAR SIR,

I should like to suggest two other windmills for Mr. Hope-Jones to tilt at. No doubt if he were fined 40 shillings he would indignantly defend the rights of the pound sterling; but how much more serious a matter might it be if the fine were mistakenly entered as '2 lb.'

Those of us who have to teach our pupils to distinguish between mass and weight, and who try to restrain them from using such phrases as *a force of 3 lb.*, receive too little support from some examiners and some text-book writers.

Many of us, again, teach our pupils to use letters to represent numbers, rather than distances, times or sums of money. We make them start an algebra problem, for example, by writing *Let x miles be the distance*, and finish it with $x = 3$. *Therefore the distance is 3 miles.* We hope that, trained in this way, they will not go wrong when they meet such a statement as *At h feet above sea level the distance of the horizon is approximately $\sqrt{(3h/2)}$ miles.* But can we expect them to be more particular about these points than the examiners whose questions they have to answer?

There is, too, the unsatisfactory compromise *Let x be the distance in miles*, inaccurate and misleading, but tolerated because it is customary. Either x is a number or it is a distance. it cannot be both at once.

Yours etc., E. H. LOCKWOOD