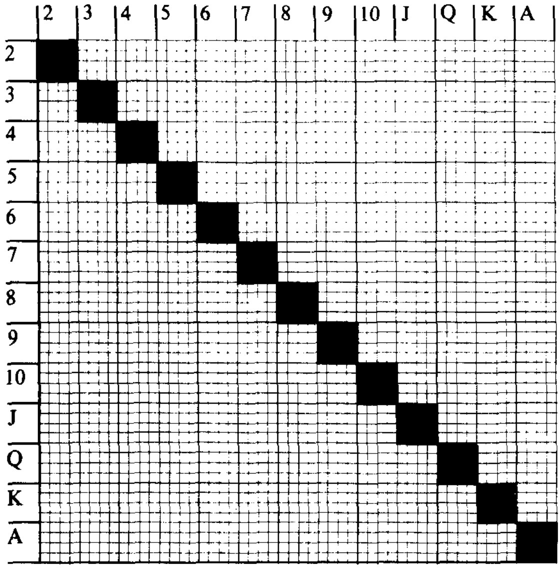

We shall apply techniques from the theory of "rook polynomials" (the problem of derangements is equivalent to placing non-taking rooks on certain allowable squares on a "chessboard" of appropriate dimensions) although the ideas need very little background knowledge. Now, by the principle of inclusion/exclusion it can be deduced that the number of such pairings is

$$52! - 51! \times r_1 + 50! \times r_2 - 49! \times r_3 + \cdots + 0! \times r_{52} \qquad (*)$$

where r_i is the number of ways of choosing i of the squares in the shaded part of the board with no two in the same row or column. But the shaded part of the board consists of 13 independent 4×4 boards: on each of these 1 square can be chosen in 16 ways, 2 squares (different rows and columns) in 72 ways, 3 squares in 96 ways, and 4 in 24 ways. Thus

$$r_i = \text{coefficient of } x^i \text{ in } (1 + 16x + 72x^2 + 96x^3 + 24x^4)^{13}.$$

Now over to a computational expert to calculate the r_is and hence (*) and, finally, the required probability, namely (*) divided by 52!(!)

G.T.Q.H.

Correspondence

The ullage slide rule

Dear Editor,

Note **73.31** "A Dipstick Problem", in the October 1989 edition, reminds me that I was going to write to you in the sixties about an antique ullage slide rule which solves this problem. I first came across this in Cardinal John Henry Newman's Room at the Birmingham Oratory in 1965 and the following year one of my pupils magically produced an identical rule which I purchased and still possess. Newman's father managed a brewery in 1816 and when Newman himself went to Trinity college Oxford, at the age of fifteen, mathematics formed part of his studies—so perhaps this is why the rule is amongst his possessions.

Ullage is either the quantity of liquid present, or the space unoccupied in the cask. The use of a dipstick determines the height of liquid present and some means of converting this to volume is needed—in the case of a non-cylindrical cask there are two separate problems namely when the cask is upright, and when on its side. A calculation would seem unlikely but the ullage rule gives two separate scales for a simple conversion.

I well remember puzzling, unsuccessfully, over graphs and calculations of measurements until I wrote to the makers whose name was stamped on the rule and who still existed at the same address in London Bridge. At that time they were still making a modern equivalent for the same use by revenue officers, but the antique rule would be about 150 to 200 years old and hand-made. The rule is of nearly square cross section with a slide on each of the four faces. There is no cursor but there is the advantage over "modern" rules in that the two slides can be put together on the same face to remove the annoyance of wanting an answer which is off the end of the slide.

Apologies to any younger readers who do not remember the joys of the slide rule but who will be surprised to know that the little job of converting a set of marks to a percentage is performed more quickly by a slide rule than a calculator!

Yours sincerely,

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Reviews

Girls and computers, edited by Celia Hoyles. Pp 83. £4·95. 1988. ISBN 0-85473-306-X (Institute of Education, University of London)

This booklet contains a collection of contributions that address the very real problem of the lack of involvement of girls in the use of computers in schools. The emphasis in the book is on the use of computers within the mathematics classroom, with several contributions on the use of LOGO in that context. While the contributions vary in quality, and particularly in their detachment from fixed points of view, there are some very interesting observations, which give useful guidelines to teachers working in this field.

The usual problem of boys tending to hog computers is cited. It is also noted that girls are not that interested in using the computer as technology, but generally need to see a fairly compelling reason for using them. As a counter to this, there are detailed and novel observations about the way that computer related work needs to be set and assessed in order to allow for the different perceptions, and ways of working, that girls might have. Included in these observations are the very positive contributions that girls can bring, such as a different, but equally effective, style of problem solving and a helpful ability to listen and empathise to other peoples way of thinking. In another section it is suggested that the use of LOGO may uniquely change conceptualisation for girls, examples given being angle and the laws of motion.

Many of the contributions are research based. Conclusions such as those given above are given sensible caveats, and the details are well worth reading for their scholarship, and the extra detail involved. In other sections of the book two assumptions are made which seem less perceptive. The first is that the approach to virtually all secondary school mathematics should be structured through self-learning, and the second is that LOGO is a final answer in terms of a programming language suitable for classroom use. It could be that both of these assumptions, particularly in relation to the attitudes of girls, could also do with some