

To the Editor, *The Mathematical Gazette*

DEAR SIR,

In the May 1968 number of *The Gazette* the reviewer of 'Modern Mathematics for Schools' by the Scottish Mathematics Group ends his review with the sentence "This is a series that can be recommended without reserve." Some quotations may indicate why there is disagreement with this sentence, as far as it concerns the geometry sections of the books.

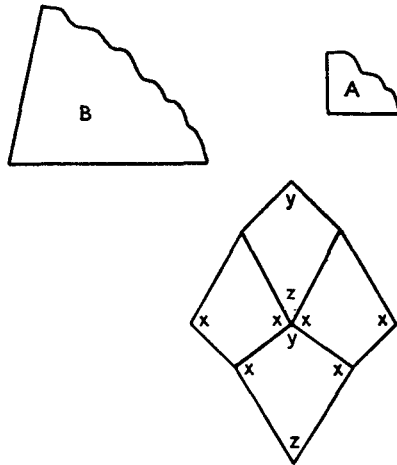
The writers of the experimental books, teachers' notes and the revised books have since 1964 published four attempts to explain what they mean by a rectangle.

- (1) 1964. Teacher's Book, Part 1, page 8 "(i) There exist shapes which can be regarded as congruent in exactly four different ways. (We select the one that has the shape of a page.) (ii) These same shapes can be used like tiles to cover the plane without gaps." According to this, a square would not be a rectangle, but a rhombus would.
- (2) 1965. Pupil's Book, Part 1, page 45 "The meaning of the word 'rectangle.' ... (i) these tiles can be fitted together side by side so as to cover a flat or 'plane' surface without leaving any gaps; and (ii) each tile can be fitted into the shape of its own outline in four different ways, of which three are illustrated in the diagrams of Figure 7." Unfortunately the letters on one of the diagrams are wrongly placed; and although a square is now possible, so also is a rhombus.
- (3) 1965. Revised Book 1, S.M.G., page 75. "Now consider the meaning of the word rectangle. ... We are going to assume two facts about these shapes ... (i) these tiles can be fitted together side by side so as to cover a flat (plane) surface without leaving any gaps. (ii) Each tile can be fitted into the shape of its own outline in four different ways, of which three are illustrated in the diagrams of Figure 11 ..." Here there is first a confusion between assumptions and facts, and this time the diagrams, which are coloured now, have the colours wrong in two and missing in a third; and there is still no distinction between a rectangle and a rhombus.
- (4) 1967. Revised Book 5, S.M.G., page 88 (Revision chapter) "The rectangle. Two basic assumptions were made: (i) A rectangle fits its outline in four ways, no two of which have a given vertex in the same place. (ii) Congruent rectangles can be fitted together to cover the plane exactly." This now distinguishes a rectangle from a rhombus, and the accompanying diagrams are now correct. But according to this latest, fourth, effort a regular hexagon would qualify as a rectangle.

This continuing confusion on the part of the writers, over a period of years, on what exactly is meant by a rectangle has produced confusion among both pupils and teachers; and cannot be recommended at all, let alone without reserve. Similar muddle and confusion occurs elsewhere in the books. Some further examples follow.

Revised Book 5, page 94. "From the fact that every diameter of a circle is an axis of bilateral symmetry we deduced that: (i) a diameter perpendicular to a chord bisects the chord ..." when in fact it is

necessary to prove that a diameter perpendicular to a chord bisects the chord in order to establish that the diameter is an axis of bilateral symmetry. The idea of angle is developed from "the shape of a corner" instead of from turning and measurement. Revised Book 1, pages 69–70. "To refer to the shape of the corner we use the word angle. ... The angle of B is smaller than a right angle ...." The second sentence here, using the first sentence, presumably means "The shape of the corner of B is smaller than the shape of the corner of a right angle." This leads to a confusion between size and shape. Which of B or A is the bigger shape? Revised Book 2, pages 62–3 shows a diagram of a tiling of congruent kites, and from it pupils are asked to deduce the angle sum of a kite. This again is confusion. The angle sum of a kite must be previously known to be  $360^\circ$  before we are entitled to produce a diagram of a tiling without gaps; the diagram as drawn begs the question.



In general terms much of the confusion of ideas in these books arises from the statement of the writers in Revised Book 1, page 74, Note to the Teacher, "Note that there is no attempt at inference by measurement in this course ...." The writers invite the pupils to arrive at conclusions by fitting of shapes, and do not seem to realise that this is in fact measurement, but of the crudest and least accurate kind, and that results obtained from it are, to say the least, untrustworthy. This kind of approach would lead pupils to accept that the well known dissection of an 8 by 8 square into, apparently a 13 by 5 rectangle, must be correct, because the parts appear to fit, and no stricter criterion is needed.

In the same number of *The Gazette*, Mr C. A. Bailey has an interesting article on 'Geometry in the Middle School.' His section 3, page 113 on 'Approaches' does not give much detail. I think that it is to these approaches that detailed attention is needed. It seems to me that the use of measurement, with openly acknowledged limits of accuracy, is the best way at this stage to establish the elementary facts about angles, lines and simple plane figures. The method is in fact to proceed by

induction, (ordinary induction, not mathematical induction) from a number of measurements to results with a definite accuracy; for example, the angle sum of a triangle is  $180^\circ \pm 3^\circ$  from class results, and so may reasonably be taken as  $180^\circ$ . This kind of approach leads to the realisation of the need, at a later stage, for an axiomatic basis; and at the early stage it protects the pupils from the 8 by 8 dissection fallacy.

Yours sincerely,  
R. D. WALTON

*The Academy,*  
*Dumfries.*

[The 'reserve' of the Scot is well known. I am grateful to Mr. Walton for his detailed notes and for the friendly tone of the preliminary correspondence. E. A. M.]

## OBITUARIES

ARTHUR PERCY ROLLETT, M.S.C.

### I.

I first remember meeting Arthur Rollett when he gave a lecture to the London Branch of the Mathematical Association many years ago. His subject was Model Making in which he was of course an acknowledged expert. On that occasion, as on many occasions since, I was impressed by his wonderful fluency and his most remarkable memory. In those days I was able to attend meetings of the London Branch regularly, and I often enjoyed talking to him. It was, therefore, with very considerable pleasure that I learnt some years later that he was coming to inspect us as a mathematical member of a group of Her Majesty's Inspectors. Needless to say his visit was helpful, informative and most enjoyable. From that time onwards we seem to have met regularly at conferences and committee meetings all over the country but I suppose mainly in the London area. Occasionally, if he had business to keep him in London, he would spend a night with me before returning to his beloved Devon. On these occasions we always sat talking well into the small hours and I never ceased to be astonished by his extraordinarily good memory of people, his wide human and artistic interests, and his never failing sense of humour. I think it is probably true to say that I listened to him more than he to me, but this was due to a lazy selfishness on my part because I so much enjoyed his saga of people and events.

He often spoke of his interest in music, of which he had a deep knowledge, of his plans for his garden at home, and of his very original experiments in brewing and distilling. He spoke a great deal about his own family and showed a very keen interest in mine.

However, I suppose that the thing that I shall always remember most clearly about him was his absolute intellectual honesty. If he had doubts about the methods or motives that one employed, either in teaching or in writing, he made his opinions abundantly clear. I often found him outspoken, but never offensive, and I always respected his opinion because it was founded upon a wealth of experience that he had gathered not only throughout England but also abroad. Next in order I respected him for his devotion to the welfare of the Mathematical