

the text. As well, it is not clear at times whether the group under discussion is supposed to be finite.

Hopefully, these defects will be removed in a second edition. Meanwhile, with some supervision, a student will find working through this book an interesting educational experience, and an enjoyable introduction to group theory.

L. O'CARROLL

DEDRON, P. and ITARD, J., *Mathematics and Mathematicians*. Translated from the French by J. V. Field, 2 vols (Transworld Student Library, 1974), Vol. 1, 325 pp., £1.50; Vol. 2, 222 pp., £1.00.

These two small octavo volumes, containing an astonishing amount of valuable material, provide a "history of mathematics" written to a new recipe. According to the authors' preface, the work "does not claim to be even a brief history of mathematics or mathematicians. It offers varied and fairly straightforward material in the hope of provoking a certain amount of reflection about the birth and development of mathematical sciences." The authors confine themselves to elementary mathematics, their survey ending at the beginning of the nineteenth century; and even then the treatment is highly selective. Thus there is no detailed account of the rise of the infinitesimal calculus; instead we are given a long and illuminating quotation from d'Alembert on its metaphysical principles. The restriction to early mathematics undoubtedly makes the work more accessible to the non-specialist, but at the same time there has been no sacrifice of standards of scholarship. A most valuable feature of the presentation is the number of extracts from original sources. While these may require the reader to switch to an archaic idiom and a different pace of thought, and to put up with a certain amount of long-windedness (as in the extract from Plato's *Theaetetus*) he is usually compensated by the clearer picture that emerges of mathematical concepts in their nascent state. The mathematical pages are frequently enlivened by biographical or anecdotal interludes.

The first volume having surveyed topics from Greek geometry through Napier and logarithms to the "golden age" of the seventeenth and eighteenth centuries, the second goes on to discuss the development of certain mathematical methods and famous problems. Some idea of the ground covered in this volume is given by the chapter headings: Written Numbers and Numerical Calculations; Algebraic Notations and First Degree Problems; Second Degree Problems; Pythagoras' Theorem; Trigonometry; Duplication of the Cube and Trisection of the Angle; Squaring the Circle.

The translation reads fluently; few misprints have been noted, and there is a bibliography and a good index. The choice of the book as a prescribed text for the Open University Second Level Course in History of Mathematics seems entirely appropriate. In spite of its small size this is a work of real distinction.

R. SCHLAPP

POPP, W., *History of Mathematics: Topics for Schools* (Transworld Publishers Ltd., 1975), vii+150 pp., £0.85.

The number of recent books tracing the development of mathematical concepts is evidence of a growing realisation that a historical perspective can be a useful auxiliary in the teaching and learning of mathematics at all levels.

The little book under review is a translation by Professor Maxim Bruckheimer of Walter Popp's *Geschichte der Mathematik im Unterricht*, first published in 1968, and is intended for the mathematical novice. It provides an introduction to the development of some of the major topics of school mathematics; it is no part of the author's plan to give biographical information. The material is divided into two parts, described

respectively as “The lower and middle school” and “The higher school”. The first covers algebra and geometry, and the second calculus and analytical geometry. The translation reads well and the treatment is clear and concise, and, especially in the second part, is illustrated by quotations from original sources. The translator has added a number of footnotes of his own and has adapted the author’s bibliography for English-speaking readers.

Although it shows no marked originality of material or treatment, this moderately priced book should prove entirely suitable for its avowed purpose.

R. SCHLAPP

HIGGINS, P. J., *A First Course in Abstract Algebra* (Van Nostrand, 1975), vi + 158 pp., £2.25 (paper back), £4.50 (cloth).

In this book the author has “tried to combine a careful treatment of the rudiments of abstract algebra with a study of various topics in which the use of abstract algebra, though not essential, is natural and illuminating”. Elementary properties of groups, rings and fields are discussed and are then used to investigate integers and polynomials. There are eleven chapters with the headings: What is Abstract Algebra?; Set Theory; The Integers; Groups; Factorisation in \mathbf{Z} ; New Groups from Old; Linear Congruences in \mathbf{Z} ; Rings and Fields; The Ring \mathbf{Z}_n and the Field \mathbf{Q} ; Rings of Polynomials; Polynomials over \mathbf{C} , \mathbf{R} , \mathbf{Q} and \mathbf{Z} .

Group theory is developed up to the First Isomorphism Theorem, direct products and subgroups of cyclic groups. The chapter “Rings and Fields” covers elementary concepts up to the First Isomorphism Theorem and the field of fractions of an integral domain. The applications reach such results as unique factorisation theorems in integers and polynomials, Euler’s theorem, and the theory of partial fractions for both integers and polynomials.

Most students meeting abstract algebra for the first time should find the wealth of applications of elementary results presented in this book both exciting and illuminating. I have some reservations, however, concerning the presentation of the theoretical aspects of groups and rings. In some places the language is not as precise as could be wished, for example “Given a partition $X = \bigcup_{i \in I} X_i$ of the set $X \dots$ ”. Proofs are surprisingly terse considering the level of the book and consequently a student may fail to grasp the full significance of the ideas. I quote two examples. Part (vii) of the first theorem concerning groups states “if $x_1, x_2, \dots, x_n \in G$ then the product $x_1 x_2 \dots x_n$ is independent of the position of brackets”. The expression $x_1 x_2 \dots x_n$ is not defined and there is no discussion of how to insert brackets to make it meaningful. The generalised associative law surely involves a subtlety that merits a careful treatment at its first introduction. The second point involves a subgroup of a group which is defined as a subset containing the identity of the group and being closed under products and inverses. The author then claims that it is easy to see that a subset of a group which is itself a group under the restricted multiplication is a subgroup. There is no discussion of the point that the subset which is itself a group might have an identity other than that of the whole group. The strength of the book however lies in its examples, applications and numerous exercises, all of which are pitched at the right level.

I have noticed one incorrect exercise (on page 38 the reader is asked to prove by induction that $n^2 \leq 2^n$ for all positive integers n) and twelve printing errors, only one of which could conceivably cause misunderstanding. The quality of printing is adequate although since it is not justified on the right the pages have a ragged appearance. The book is reasonably priced and its enthusiasm and practical approach make it an interesting introduction to abstract algebra.

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