treatment is rigorous, no attempt is made to give applications to applied mathematics and the order of development of topics is logical rather than simple.

In the introduction he gives a set of axioms for the system of real numbers and a sketch of Dedekind's construction of them. There follows over 100 pages on infinite sequences and series, functions, continuity and uniform convergence. Here are proved many subtle results (e.g. Cauchy convergence test, theorem on uniform continuity, Weierstrass theorem) needed later. There follows a chapter on the Differential Calculus which is developed as far as Taylor's theorem. The final chapter on the Integral Calculus is based on the result that every function continuous in a closed interval is a limit of a uniformly convergent sequence of polygonal functions. He deduces the integrability of continuous functions and rightly confines his treatment of the Riemann integral to a starred section (which may be omitted). The book ends with a discussion of improper integrals and the Fourier series of piecewise smooth functions.

There is a short section explaining the notation of mathematical logic. He illustrates by giving various definitions (e.g. of limit and continuity) in this notation and he shows how in the definitions of uniform convergence and uniform continuity the order of the universal and existential quantifiers is essential. He rightly says " For many students (not for all, perhaps) the notation of definitions of certain notions by means of the logical symbols makes it easier to understand these notions . . ."

The English translation is very clear, only rarely being not quite idiomatic. Most of the proofs are followed by useful comments and illustrations. While there are exercises at the end of each section, there are still not enough to suit the British tradition. The author says that Professor I. N. Sneddon and Dr. J. Hunter are preparing a book of problems to fill this gap. As a sound account of the calculus of functions of one real variable this book can be recommended.

H. S. A. POTTER

PLUMPTON, C. AND TOMKYS, W. A., *Sixth Form Pure Mathematics*, Vol. I (Pergamon Press, 1962), X+480 pp., 21s.

This book, which covers most of the Pure Mathematics required for the single subject Mathematics at Advanced Level, is the first of a series of volumes on Pure Mathematics and Theoretical Mechanics for Sixth Form students.

It is currently fashionable to develop mathematical topics by a concentric treatment. Here, although the subject matter is standard, the major topics of algebra, calculus, coordinate geometry and trigonometry are developed in accordance with modern trends.

The chapter devoted to the quadratic function and the quadratic equation is particularly good. Every chapter ends with a good selection of carefully graded examples.

The book is moderately priced, and can be recommended to students studying for entrance to Universities and Colleges of Advanced Technology.

W. CRAIG

Popular Lectures in Mathematics—(i) *The Method of Mathematical Induction* by I. S. SOMINSKII, (ii) *Fibonacci Numbers* by N. N. VOROB'EV, (iii) *Some Applications of Mechanics to Mathematics* by V. A. USPENSKII, (iv) *Geometrical Constructions Using Compasses Only* by A. N. KOSTOVSKII, (v) *The Ruler in Geometrical Constructions* by A. S. SMOGORZHEVSKII, (vi) *Inequalities* by P. P. KOROVKIN (Pergamon Press, Oxford, 1961).

The books are issued separately at 10s. each, with the exception of (i), which costs 7s. 6d. They are also issued in one volume costing 50s.

This series, edited by I. N. Sneddon and M. Stark, consists of English translations

of booklets published in Russia between 1951 and 1959. They are quite short, from 65 pages to 91 pages in length, and have been translated by Mrs. Halina Moss. All of them can be recommended for school libraries.

(i) The book on *Mathematical Induction* provides a very clear exposition of the induction method. There are many examples, some with full solutions in the text. For the other examples solutions are given in a last chapter. The book can be strongly recommended to pupils in sixth forms at school and to students in the first year at the university.

(ii) This is a well written booklet on the elementary properties of the *Fibonacci Numbers*, which should prove interesting and instructive to senior pupils in schools. After proving the simplest properties, Binet's formula for the general Fibonacci Number is derived and divisibility properties of the numbers are obtained. This latter treatment is preceded by an introduction to Euclid's algorithm with simple properties of the greatest common divisor of two numbers. The relations of continued fractions and of the golden section in geometry with Fibonacci numbers are discussed. The book is readable and the exposition detailed and clear.

(iii) *Some Applications of Mechanics to Mathematics* is based on a lecture given to seventh year secondary school pupils at Moscow. The principle of least potential energy is used to obtain tangents to circles and conics and the position of the centre of gravity of point loads is used to prove Ceva's theorem and to solve a problem in the theory of numbers. This would be quite a good book to have in a school library as light reading for senior pupils of mathematics.

(iv) *Geometrical Constructions Using Compasses Only* begins with a historical introduction and then various geometrical problems are solved using compasses only. The fact that the inverse of a straight line is a circle is used to give a general method of construction based on the method of inversion. In the second part of the book constructions are discussed where restrictions are put on the size of the angle made by the legs of the compasses. A sixth form pupil with an interest in geometry would find this book most interesting, although, considering the trend away from geometry in school mathematics, it may well be that the book would have had more value for an earlier generation of school mathematicians.

(v) The first part (38 pages) of *The Ruler in Geometrical Constructions* is devoted to standard work on inverse points, harmonic ranges, etc. The second part (48 pages) gives an account of ruler constructions based on the ideas developed in the first part. It is shown that any construction which can be performed using ruler and compasses can be performed with a ruler only, if the centre and an arc of a circle are given. It is also shown that it is impossible by means of a ruler alone to find the centre of a given circle.

(vi) *Inequalities* is really a collection of problems involving important inequalities. More than half of these are solved in the text and solutions of the rest are given in the last chapter. None of the theorems on operations with inequalities is proved; in fact they are not even stated and a knowledge of them is assumed. All teachers who have taught inequalities to sixth form pupils or first year students know how difficult they are found to be. This book, used along with a standard text, should be a considerable help.

R. P. GILLESPIE

ROBERTS, J. B., *The Real Number System in an Algebraic Setting* (W. H. Freeman and Company, San Francisco and London, 1962), 145 pp., 10s.

This book contains a definition of the real numbers starting with the natural numbers. The first chapter gives a survey of the properties of sets, mappings, relations. operations and algebraic systems, which are used throughout the book. The pictorial