involution is obtained by interchanging the variables in a bilinear relation and subtracting, instead of by squaring a matrix as on page 49, the fact that it suffices for *one* pair of distinct points to have the involutory property is proved simultaneously; the author has to give a separate proof on the following page. A slight modification of the argument on page 54 shows that *three* perpsectivities suffice to construct a projectivity on a line.

The book is clearly printed and contains a large number of examples, the most important of which are accompanied by solutions, thus augmenting the theory developed in the text.

D. MONK

KEENE, G. B., *Abstract Sets and Finite Ordinals* (Pergamon Press, 1961), 106 pp., 21s.

This book shows how the theory of finite sets and ordinals may be based on set theory. To avoid Russell's paradox (about the set of all sets which do not belong to themselves) set theory must be rather complicated. Here Bernays' version of set theory is used. Bernays distinguishes between *classes* and *sets*. Every set determines a class having the same members, but not vice versa. The only objects that can be members either of classes or sets are sets. There is an axiom that if x is a set and y is a set, there is a set whose only members are y and the members of x. Taking $x = y$, we have x', the set whose only members are x itself and the members of x (it is called the self-augment of x). Starting with the empty set O, we obtain O' which we denote by *1*, *1'* which we denote by *2*, and so on. Every class C determines a predicate or property, that of belonging to C; but not every predicate P defines a class, so we cannot necessarily speak of the class of all sets having property P. Writing capitals for classes, small letters for sets, the predicates defining classes include those of the forms $x \in y$, $x = y$, $x \in C$, and any predicate obtainable from such expressions by means of *and*, *not*, $\exists$. We cannot obtain Russell's paradox, but we can do ordinary mathematics.

The book requires no previous knowledge of logic or mathematics. It is intended for the general reader and for students of logic or mathematics. Most undergraduate students of mathematics would find it rather hard reading. It can be highly recommended to graduate students of mathematics.

D. G. PALMER

ROTH, K. F., *Rational Approximations to Irrational Numbers* (University College London Inaugural Lecture) (H. K. Lewis & Co. Ltd., 1962), 13 pp., 3s. 6d.

In this inaugural lecture Professor Roth surveys the field of Diophantine approximations, a subject to which a new lease of life has been given by his own work. A series of theorems are stated and explained, culminating in the Thue-Siegel-Roth theorem, and the lecture concludes with a brief discussion of simultaneous approximation and other unsolved problems.

R. A. RANKIN

SHKLARSKY, D. O., CHENTZOV, N. N., AND YAGLOM, I. M., *The USSR Olympiad Problem Book*; Revised and edited by IRVING SUSSMAN; Translated by JOHN MAYKOVICH (W. H. Freeman and Company, 1962), 452 pp., £3, 3s.

This book contains 320 unconventional problems in algebra, arithmetic, elementary number theory and trigonometry. Most of them first appeared in the competitive examinations sponsored by the School Mathematical Society of the Moscow State University and in the Mathematical Olympiads held in Moscow. The book is designed for Russian students between thirteen and sixteen years of age, and very bright they must be. As the authors say, there are few problems whose solutions require mere formal mastery of school mathematics. Original thinking, often of a very high order, is necessary for most of them. The book will prove to be a most useful mine of ideas for teachers and examiners looking for ideas for questions off the beaten path. Many of the questions should be excellent as supplementary material to stimulate the interest of bright pupils, and to help them to sharpen their mathematical wits. Over three-quarters of the book is devoted to detailed solutions, and, for those who want a hint rather than a full solution, there is a final section containing answers and hints. The volume is beautifully produced.

R. A. RANKIN

AUSTWICK, K., *Logarithms* (Pergamon Press, 1962), xiii+102 pp., 8s. 6d.

This book is intended for use up to " O " level in schools, for self-tuition, and by teachers insufficiently qualified in the subject. It confines itself to the use of 4-figure log tables in computation. Two methods are followed. Method 1 is based on showing that, by following standard procedures, the tables work. Method 2 is slightly more theoretical and assumes the index laws for rational indices. In the earlier chapters these methods alternate: in the last three they gradually merge. A key in the first chapter allows their separate study.

Of the potential users indicated, those most likely to benefit are the self-taught. Schools are likely either to adopt a slide-rule approach instead of Method 1, or to base their equivalent of Method 2 on a sound knowledge of the index laws, leading either to the use of powers of 10, or to that of standard form. As for the insufficiently qualified teacher, he or she ought not to be content with the skeleton theory given here.

No numerical errors have come to light, but it should be pointed out that on pp. 19, 20 and 25 the text ignores the distinction between a power of 10 and its index.

Great care has been taken by the author; the examples are excellent and printing and lay-out are excellent. It is a pity that the restricted scope must inevitably limit the book's appeal.

S. READ

MAXWELL, E. A., *Deductive Geometry* (Pergamon Press, 1962), xiii+176 pp., 12s. 6d.

This assumes initial " O " level attainment, and is a first-class introduction to " A " and some traditional " S " level topics in Pure Geometry by an acknowledged master. The omission of a few " S " topics, e.g. ranges in involution, is more than compensated for by the inclusion, in Chapters 10 and 11, of up-to-date basic ideas on spherical trigonometry, and on translations, rotations, expansions, of a figure.

As much of the notation of set theory as needed later, is explained in an introductory chapter and is then used where appropriate throughout. The result is a great gain in conciseness and clarity, besides effecting a useful junction with the use of similar notation in other branches of a pupil's mathematics. In only one place is a trace of possible nostalgia noticeable, on p. 33, where the lengthier translation into set language of the compact, metaphoric " D' is the mirror image of H in BC," is tactfully relegated to a parenthesis.

The examples at the ends of chapters demand mainly the proof by the pupil of further standard theorems, though there are occasionally a few additional problems. Excellently printed and produced, this is a fine book for sixth-form pupil and teacher alike.

S. READ