

age devices (multi-aperture ferrites, cryogenic stores, etc.).

The quality of the papers taken as a whole is high (which perhaps is a reflexion of the fact that many of the writers are the established authorities), and all have useful bibliographies. The topics cover a wide range, from the logically mathematical to the severely practical, and it is unlikely that any one reader will be interested in them all, but this is not unusual in the *Proceedings* of symposia. In many cases the material presented is of much wider significance than the title of the book would suggest, and while the principles and techniques are undoubtedly of use in spacecraft, they could also be of considerable value in other applications where digital control and information processing are used.

G. J. HERRING

Random Essays on Mathematics, Education and Computers

By John G. Kemeny. Pp. ix + 163. (Englewood Cliffs, New Jersey, U.S.A., and London: Prentice-Hall, Inc., 1964.) 40s.

DR. KEMENY, head of the Department of Mathematics at Dartmouth College (U.S.A.), has made many successful experiments in presenting modern mathematics to his advanced pupils. The books on *Finite Mathematics* of which he is part-author show how far he has gone in removing dead wood and in introducing and using quite difficult concepts at an early stage. In *Random Essays on Mathematics, Education and Computers* he has collected a number of his essays, all more or less grouped around his own experiences, under three headings.

In the first section Dr. Kemeny writes convincingly about mathematical values, of his efforts as a mathematical missionary, of how to encourage rigour in demonstration without stifling intuition, of why it is not undemocratic to pick out and cherish the pupil who shows himself to be mathematically gifted. These essays, like the rest of the book, are intensely human and readable, and it is difficult to resist the temptation to quote from so much wise and vivid material. Envy compels me to make one extract: in this decade, Dartmouth College Library should reach one million volumes, it takes more than one hundred mathematical periodicals, and spends more than 100 dollars a month on mathematical books; yet Dartmouth is not one of the larger colleges in the United States.

The second section deals with matters of organization, in an idiom of units and grades that will not be very familiar to the British reader, but, for example, in setting the well-rounded man against the specialist, Kemeny makes his discussion of universal interest to teachers. In the essay on "The Vanishing College Teacher", his ten points to remedy the fact that "as far as the average undergraduate is concerned, the well-qualified science professor is nearly extinct" may well be of interest to Britain's new universities. The final section considers, among other matters, the place of the computer in colleges of liberal arts and science, and the way in which computers may be expected to be of service to libraries by A.D. 2000.

This is a lively, entertaining and instructive book, which will be of value to anyone who is concerned in any way with mathematical education.

T. A. A. BROADBENT

Solid Lubricants and Surfaces

By E. R. Braithwaite. Pp. viii + 286. (London and New York: Pergamon Press, 1964.) 84s.

SINCE the Second World War there has been a rapid growth in the use of solid lubricants by industry, and the appearance of a text-book specifically dealing with this subject is not only welcome but also long overdue.

Research in this field embraces a number of scientific disciplines, and there is little doubt that this book will interest a wide range of readers. The author has clearly recognized this fact in compiling his manuscript, and he has devoted a number of chapters to a general introduction of friction and wear phenomena together with a survey of the many other techniques available to-day for studying surfaces. Some of this material could have been arranged with more care. One chapter, in particular, attempts to cover such diverse topics as friction and wear-testing machines, surface profilometers, X-ray and electron diffraction investigations and particle size-surface area measurements. Such close grouping requires careful attention to sub-headings, and it is confusing, for example, to be led from a consideration of surface profilometry to the question of stacking faults and other crystal defects without adequate warning.

The second half of the book provides a useful survey of the properties and uses of the many solid lubricants available to-day. The modern repertoire of the lubrication engineer is so extensive that the author has not found it possible to direct equal attention to every aspect of the field, and he has concentrated on the two most widely used materials, namely, graphite and molybdenum disulphide. The author has been particularly closely associated with the production and use of these two important lubricants, and the subject has been tackled in an authoritative manner.

The style of presentation is extremely variable, and it is to be hoped that the many clumsy passages and tiresome errors present in the text will be eradicated by the time the second edition appears. K. H. R. WRIGHT

Location and Land Use

Toward a General Theory of Land Rent. By William Alonso. Pp. xi + 204. (Cambridge, Massachusetts: Harvard University Press; London: Oxford University Press, 1964.) 44s.

THIS volume is concerned with the basic economic theory relating to the price and use of land in urban areas. It is not a book for the layman, but for all economists working in the field it is essential reading. The argument is presented mainly in mathematical terms, but Alonso goes to a good deal of trouble to make the broad sweep of his thinking clear to those who do not have a strong mathematical background, and such persons should not be put off by a quick glance at the rather formidable array of symbols and graphs which the book contains.

Alonso begins by considering the factors important in determining the demand for urban land both by enterprises and by consumers. He then proceeds to show how the forces of demand and supply will, as part of the process of clearing the market, produce a certain pattern of land use. Some of the implications of the free market solution and also some of the implications of interference with it are then considered both in a static and dynamic context.

Probably the most interesting feature of the book is the treatment of the factors determining the demand for residential land. Alonso shows in a most careful and elegant manner how the price, location and quantity of land demanded are linked together. The price of land tends to decrease as one moves away from an urban centre, but the cost of transport to such a centre goes up. Alonso shows how these two opposing influences affect the eventual demand for both quantity and location and how a consumer's expenditure on land plus transport varies in relation to his income and other expenditures. Although this is the section which is most original, the book also makes a valuable contribution to our understanding of the factors which are important in influencing the demand for urban land by traders and manufacturers, and as a whole it is a significant contribution to a difficult and somewhat neglected field.

D. WALKER