the motion of vehicles within the sphere of action of the earth's gravitational field. Formulae for the mass ratio of an exponentially expended space rocket are given.

There are very few misprints, such as a superfluous minus sign in Eq. (8.4) which otherwise duplicates Eq. (3.27). Repetition and duplication of equations and text is practiced to a rather excessive extent [e.g. typically on page 66, Eqs. (4.20) and (4.22) occur twice]; with some systematization, the size and price of the booklet could have been cut very substantially without sacrificing anything of the contents.

On pages 29-32, the term "weightlessness" is used in the sense of the equality of gravitation and centrifugal force in a circular orbit; this may cause misunderstanding, as it has nothing to do with the problem of unconditional weightlessness on a space vehicle in free orbital flight.

As a two-body exercise of narrow scope, the work has been done very thoroughly, with detailed derivation of all the equations, beautiful and imaginative illustrations, and instructive tables. Its reading by a novice should be an easy matter.

Physics for Engineers. By G. F. Lewin. 310 pp. Butterworths, London, 1963. $9.95. *Reviewed by Robert L. Weber, The Pennsylvania State University.*

At a time when the most widely used American textbooks of physics for university students in science and engineering are pushing beyond a thousand pages in length and can be carried comfortably only in two-volume editions, it is interesting to see how well a British author can write a 310-page textbook which "provides a complete treatment of the theory of physics in a form which the engineer will understand without difficulty . . . and explains in detail the basic concepts and shows how these are related to the more advanced theoretical work of engineering".

The order of topics is somewhat unconventional. The text begins with five chapters on heat and kinetic theory of gases. There follow three chapters on light, two on wave properties and sound, and a chapter on the use of interference and diffraction in making accurate measurements. The text closes with chapters on electrical engineering and physics, mechanical engineering and physics, and nuclear and solid-state engineering and physics. The writing is terse. The reader is apparently assumed to be familiar with general physics and calculus. The mks system of units is usually employed. The student is offered some 67 exercises, with answers given, in contrast to the hundreds in a conventional American text.

Physics for Engineers is said to "cater for mechanical and electrical engineers in the first year of their Diploma in Technology courses". It is perhaps assumed that they will have had an introduction to mechanics and to electricity, for the one chapter on mechanics is chiefly concerned with simple properties of fluids, and contains also some remarks on accuracy of measurement, optical determination of stress, and flaw detection by radiography. There is a good but very compressed chapter on electrical principles including lumped circuits, transmission lines, and aerials.

The author has apparently been concerned with imparting a working knowledge of certain topics he deems important and not particularly with the most recent information, even in areas being stressed. The gas-thermometer scale is discussed at some length in terms of the older two-point calibration. The reference given for the International Temperature Scale is not the current one. Isotope masses are still referred to that of oxygen as 16. References to the literature are mostly to adequate standard books, some recent better ones being overlooked. A few statements might better have been omitted, such as, "the radiation pyrometer . . . may be used for measuring higher temperatures than the optical pyrometer, whose maximum is defined by the melting point of the lamp filament".

It is easy in criticizing any book, and especially a concise one, to differ with the author on the relative merits of topics included and excluded. Here one might suggest that it would have been better to include Newton's laws of motion instead of Newton's "law" of cooling, or third-order ray tracing theory, etc. However, some topics not often included in an introductory text which might appeal to users of this book are: a calculation for an achromatic model eye, instability of a fluid, Schrödinger's equation, radiation pressure, the color triangle, photometric data, vibrations sustained by an airstream, measurement of Poisson's ratio, the simple multivibrator and counter.

Physics for Engineers will probably be most used as a review and a reference book rather than as a complete textbook from which a student gains his initial understanding of physics.

The New World of Physics. By Arthur March and Ira M. Freeman. 195 pp. Random House, New York, 1962. $4.95. *Reviewed by Michael W. Friedlander, Washington University.*

Only two cultures? As many as two? Many of us have our own private prejudices on this subject, but are there any who will deny that the average nonphysicist has remarkably little knowledge or understanding of the structure we call physics? Unfortunately, too, so many who wish to educate themselves emerge from their labors with the most remarkably garbled ideas. Books which try to remedy this are to be welcomed, but perhaps they should be treated like drugs—given only under the direction of a doctor (of physics), and with a warning. This warning is essential: The reader must expect to exert himself intellectually to a degree to which he is probably normally unaccustomed. There is no easy way to an understanding of physics—hard (mental) work is needed. Even a popular book on physics should not be read like a novel, and if it can be, then I would suggest that it is not fulfilling its task. So much of physics involves unfamiliar ideas: abstractions, continuity and discreteness, precision in the use of a technical language, the use of mathematics to carry out quantitative calculations.

The danger of writing a popular book is that it might turn out to be too popular through the simple device of avoiding the important ideas of physics. Professors March and Freeman appear to have avoided this pitfall and have covered the historical development of the subject through its many stages from Aristotle to quantum theory. They have avoided mathematical operations. To some extent, one must be sympathetic with this approach—so many readers would be lost if even the simplest of mathematics were introduced, but physics is essentially a quantitative subject, and the almost complete omission of not only mathematics but also numbers seems to be overdoing it. For instance, part of the difficulty encountered by a layman in trying to "understand" relativistic and quantum phenomena lies in the high value of c and the small value of h, so that our everyday experiences are so far removed from those phenomena for whose description we have been forced to introduce these concepts.

There are places where the unwary or poorly prepared reader may have trouble and the going will be heavy. This is *not*, as the dust jacket claims, a book that "any interested layman and bright student can *readily* absorb" (my emphasis). But perseverance is worth while—the topics discussed are fundamental and enough interest may be generated to induce the reader to attempt more advanced treatments. This is not to say that there are not places in the book where others would not have had very different ways of dealing with the topics chosen, but it is so very hard to bring modern science to a digestible level, and the approaches are so personal and subjective, that serious attempts must be commended.

Progress in Solid State Chemistry, Volume 1. H. Reiss, ed. 536 pp. (Pergamon, Oxford) Macmillan, New York, 1964. $17.50. *Reviewed by Stuart A. Rice, University of Chicago.*

There are a variety of ways in which a review volume can be assessed. We might ask the following questions:

(1) Is the volume necessary?

(2) Assuming that it is necessary, is the selection of articles appropriate?

(3) Assuming that (1) and (2) have been properly carried through, is the collection timely?

(4) Are there characteristics of the individual articles which are worth special mention?