Books

Math is Fun (Revised Edition). By Joseph Degrazia. 159 pp. Emerson Books, Inc., New York, 1954. $2.75.

This little volume is a pleasant addition to the long list of mathematical "recreations" books beginning with the classic by W. W. Rouse Ball, extending down through Steinhaus' remarkable "Mathematical Snapshots" and the intriguing volume by Kraitchik. It goes almost without saying that many perennial problems and puzzles have found their way into more than one of these books, yet the appearance of a new collection will always be welcomed by devotees of this pastime on the chance that something new will be found to challenge their ingenuity.

Mr. Degrazia points out the fact that "the staples of scientific entertainment are certain historic problems which have perplexed and diverted men for centuries." He adds, however, that the majority of the items in the book are new, many having been devised by the author himself. It is stated that nothing beyond a knowledge of simple high-school mathematics is needed to solve most of the puzzles, and that many call for only ordinary arithmetic.

Mention of some of the chapter headings may serve to give a general indication of what is included in the collection: Cryptograms get a chapter; How Old are Mary and Ann? (remember this kind?) merit another one. Wolf, Goat and Cabbage deals with river-crossing problems. The author tells us that the teacher of Charlemagne devised this type of brain-teaser for his imperial pupil, and that a seventeenth-century Italian mathematician worked out a more sophisticated version involving three jealous husbands and their wives. There are chapters dealing with Clock Puzzles, Speed Puzzles, Railroad Shunting Problems, etc. The author acknowledges the omission of magic squares and of geometrical problems, but promises to deal with the latter in a subsequent publication.

In an Appendix, solutions to the problems are given "where needed". A sample, selected from the chapter entitled On the Borderline of Mathematics, reads: "If Bill and Cal were wearing red hats, Abe would have known that his hat was blue, because there were only two red hats. Since Abe didn't know the right answer, Cal concluded that there remained only two possibilities for himself and Bill. Either both had blue hats or one had a blue, the other a red hat. If he himself had a red hat, Cal reasoned, Bill would have concluded that he, Bill, had a blue hat, because otherwise Abe would have known that he, Abe, must have a blue hat. So Bill, because he was not able to tell correctly the color of his own hat, involuntarily betrayed to Cal that his hat was not red. Therefore, Cal could tell that his hat was blue."

If you enjoy this sort of thing, *Math is Fun* is your meat.

Ira M. Freeman
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Handbook of Probability and Statistics with Tables. By Richard Stevens Burington and Donald Curtis May, Jr. 332 pp. Handbook Publishers, Inc., Sandusky, Ohio, 1953. $4.50.

With one reservation, I recommend this book to physics libraries and to any physicist who ever computes deviations from a mean. The reservation relates to least squares; elsewhere, I think the authors have done very well a job that needed doing.

There are plenty of books on statistics; the trouble is, they try to make their readers into statisticians. We physicists would use statistical methods more if we could find out *quickly* what the methods are. Here is a book that will help. It covers the essential concepts and techniques tersely but intelligibly; it wastes no space on proofs or on tedious algebraic details, but it discusses the definitions and formulas fully enough to give some understanding of their implications and applications.

The eighteen chapters of the text cover the basic concepts of statistics and probability theory, the important distributions, the techniques of statistical inference from samples, the analysis of variance, and several other topics. The twenty-three tables include the standard statistical tables and tables of elementary functions that are useful in statistical calculations. There are many diagrams and illustrative examples; indentation and bold-faced type are used effectively.

My objections to the authors' treatment of least squares are the following. What they present is a purely formal procedure. They do not relate this procedure to maximum-likelihood estimation, which they discuss elsewhere in the book, or to the theory of best linear estimates, which they omit altogether. They imply that determinants provide a practical method of solving the normal equations, and they ignore orthogonal polynomials. A physicist who relies on this book for an up-to-date account of least-squares theory is likely to do what several physicists have done: laboriously rediscover a well-known theorem of Gauss, Chebyshev, Markov, Fisher, or Neyman and publish it as original research. What needs to be said would fit into the blank space on page 133; I hope it will be there in the next edition.

Here are two suggestions for minor improvements. (1) Analysis-of-variance enthusiasts may think the treatment of experimental designs inadequate; I believe that in most respects it is a sufficient introduction to a highly technical subject, but the skeptical reader will suspect that Latin squares are impossible, for not one is written down. Why not include several? There is room on page 211. (2) There is a good concise bibli-

ography at the end of the book, and my spot-checks of the index rate it high; but the reader will sometimes wish there were a larger number of specific references in the text on individual topics.

Many physicists, ignorant of better methods, apply large-sample formulas to counts of eight. Yet small-sample theory is well developed; the only excuse for ignoring it is the difficulty of finding it and of penetrating the jargon that surrounds it. For that task in particular, I think this compact book will prove very helpful.

William Fuller Brown, Jr.
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Ferromagnetic Domains. By K. H. Stewart. 176 pp. Cambridge University Press, New York, 1954. $4.75.

There are few, if any, fields of physics which are so uniquely connected with the work of one man as ferromagnetism is connected with that of Pierre Weiss. His two hypotheses, the molecular field and the domain structure, both proposed nearly half a century ago, not only proved to be extremely fruitful but, enlarged and reinterpreted in terms of modern physics, still constitute the backbone of the present theory of ferromagnetism. This is particularly true of the domain theory which is the subject of this Cambridge Monograph on Physics. The early development of the theory was so rapid and successful that in comparison recent years brought relatively few striking new results or improvements. It is significant that only about half of the experimental data and quantitative diagrams in the book are based on material published within the last 25 years. This "comprehensive" character of the book has the great advantage that it gives a fairly uniform coverage and is an excellent introduction to the whole field. It has the drawback that newer results do not occupy as much space as some readers may wish. This is not to say that important ones have been omitted but rather that the treatment tends to be qualitative and not many experimental data are given. On the other hand, the recent beautiful work of Neél and his school and the very elegant experiments performed at the Bell Telephone Laboratories are treated in detail. The reviewer found no reference to the very interesting work of Hughes on the influence of domains in neutron transmission.

The first chapter is a general introduction to the subject and it is followed by chapters on magnetic anisotropy and on magnetostriction. The field of domains proper is discussed in three subsequent chapters on domain arrangement, on domain walls, and on hindrances to domain wall movements. The closing two short chapters are on time effects and on magnetic and thermal energy changes. The book has 70 figures, 7 plates of various power patterns but no subject index. On the whole it is a very commendable introduction into the field of magnetic domains with adequate references (over 160) for further study.

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Procedures in Experimental Metallurgy. By A. U. Seybolt and J. E. Burke. 340 pp. John Wiley and Sons. Inc., New York, 1953. $7.00.

This book is written for the experimenter who is new to the study of metals or for the young research metallurgist who is unfamiliar with the many important laboratory techniques which are now used in the preparation of metal and alloy specimens for study. It is assumed that the investigator is familiar with general physical and chemical principles.

The preparation of metal samples, up to the point of obtaining data on the properties of the metal, is the main theme of the book. The authors have included the various steps of specimen preparation, such as the selection of the base metals, the principle of alloying, melting, casting, fabrication, heat treatment to desired structures, and special techniques for the preparation of single crystals and of samples by the method of powder metallurgy.

As most of the operations in the preparation of samples involve high temperatures, the procedures for obtaining high temperatures, their measurement and control, the various vacuum and controlled atmosphere systems, the commonly available refractories and the preparation of crucibles are covered fairly extensively in the first six chapters of the book. The remaining chapters are devoted to the procedures for the preparation of the samples of metals or alloys.

Emphasis throughout the entire presentation has been placed properly upon the constructional features of equipment and the basic principles involved in its use; the text is copiously illustrated with excellent assembly drawings. The reader is not burdened with an excess of relatively unimportant minute details.

The scope of the book is narrower than the title suggests. The authors have omitted investigational techniques, such as microscopic examinations, x-ray diffraction methods, thermal analysis, mechanical testing, etc., as they believe satisfactory publications on these subjects are available.

G. W. Geil
National Bureau of Standards

Roger Bacon in Life and Legend. By E. Westacott. 140 pp. Philosophical Library, New York, 1953. $3.75.

This is easily the worst written book that I have ever read. As an example of the author's style, here is a complete paragraph chosen more or less at random (it appears on page 94):

"On 4 July 1928 A. G. Little, a Fellow of the British Academy, put forward the view that the writings of Bacon had been studied continuously since his death, and that they are still being studied."

The whole book is composed of a succession of short paragraphs of this kind. It appears that the author had collected notes for a biography of Bacon, listing and briefly summarizing all the published literature he could find on the subject. To make this material into a book, he threw it together, divided it into ten-page chapters, added a few introductory and concluding sentences, and