

nature of a vector is a mystery, although they could write out a complete theory of the central axis; and to whom numerical calculations of any description are as the abomination of desolation. In his *Leçons* the author has provided the student with an ample supply of algebraical exercises, and to these the volume before us provides a supplement, the scope of which is indicated by the warning: "Bien entendu, il n'aura jamais de recul devant les calculs numériques, sans quoi il vaudrait mieux fermer le livre pour toujours et changer de carrière." The chapters are arranged to be worked through, *pari passu*, with corresponding sections in the *Leçons*, so that a wide extent of ground is covered in these 120 odd pages. Close attention is paid throughout to relative and absolute errors. Many of the exercises deal with problems occurring in railway management, and may be novel on this side of the Channel. The book will be a useful addition to the library of the teacher or examiner.

(6) Miss Hudson's monograph on "Ruler and Compasses," which has somehow strayed into this group of elementary text-books, takes us on to a higher plane. Class-book in its entirety it can scarcely be in the schools of to-day, but none the less will it find a place on the shelves of the teacher who is in search of leading ideas, of the folk who in other days would have exhibited their taste for geometrical study in the "Palladium," the "Apollonius," or the "Ladies'" and "Gentlemen's" Diaries of their time. There must be a considerable proportion of those possessed of general culture who see something repellent in analysis, who find generalities too great a burden for their powers of assimilation, and who nevertheless have a native talent for the elementary investigations of pure geometry. Among them is, for instance, that small coterie who feel a never-failing charm in the elusive mysteries of cyclometry. To these it will appeal as well as to the mathematical elect, beginning with the cream of the schools—who will find Miss Hudson's book uncommonly useful, for example, in preparing for their "essay paper," quite apart from its intrinsic interest and value—and passing on to the trained mathematicians, whose interests have been mainly analytical, and who will be glad to find within two covers a host of material such as that due to Messrs. Richmond, Gérard, Hobson, etc. How many of the old stagers have heard of an *Einheitsdreher*, or can state the meaning of geometrography? We cannot better describe the author's scheme than in her own words: "The connecting link through the book is the idea of the whole set of ruler and compass constructions, its extent, its limitations, and its divisions." In completeness and in clarity of exposition it ranks with a companion volume in the same series, the "Projective Geometry" by Prof. Mathews, and, though not comparable in scale, we do not think that "masterpiece" is too strong a word to apply to each. Some day, but not yet, we may forgive Miss Hudson for the omission of an index.

W. J. G.

## OUR BOOKSHELF.

*First Course in General Science.* By Prof. F. D. Barber, M. L. Fuller, Prof. J. L. Pricer, and Prof. H. W. Adams. Pp. vii+607. (New York: Henry Holt and Co., 1916.)

THIS book is written for the American school child. It opens with the statement that "the primary function of first-year general science is to give, as far as possible, a rational, orderly, scientific understanding of the pupil's environment to the end that he may, to some extent, correctly interpret that environment and be master of it. It must be justified by its own intrinsic value as a training for life's work." Setting out with this idea, the authors take the various phenomena with which the child is likely to be confronted, and deal with them in a manner calculated to arouse his interest. The opening chapter deals with lighting: with candles, lamps, and kerosene; these subjects lead up to evaporation, boiling temperature, etc., then to petroleum, gasoline, coal gas, and finally to electric lighting. In the second chapter the authors pass on to heating: fires, stoves, combustion and energy, chemical compounds, coal, the measurement of heat, house-heating and cooking. A third chapter is devoted to the refrigerator, which plays a large part in the domestic economy of the States; this leads on to ammonia, the freezing of water, and cold storage. The weather is next discussed. The child by this time has gathered some general physical ideas and he can the more easily grasp the somewhat complex problems now presented to him. Meteorological instruments, weather charts, the seasons, climate and its relation to health, are all described. The principles of ventilation are then treated at length, followed by an account of dust, the vacuum cleaner, and the dangerous, because dusty, hangings of rooms.

The authors then deal with a wholly different subject: food. They are concerned more particularly with its preparation on both the large and the small scale. The next chapter is devoted to micro-organisms, and later chapters to soil physics, sewage, and machinery.

Thus the whole range of a child's experience is fairly well covered. It is difficult to form an opinion as to the general suitability of a book of this sort: usually one tells children about these things, and adapts one's methods to the audience, developing a theme when it seems desirable, but never treating two different audiences in the same way. Probably the best use of the book is as a teacher's guide to give him "copy" which he can work up and adapt to his own class.

*The Mechanical Star-bearing Finder: A Simple Guide to Night Marching in Southern England and North France.* By E. T. Goldsmith. (London: George Philip and Son, Ltd.) Price 5s. net.

THIS is a convenient pocket arrangement by means of which one can solve several of the problems which are capable of solution by the