

treated rigorously when the student knows a little plane geometry. Neither in the First Course nor in the present work do the authors offer more than an intuitional explanation of the fact that a first degree equation defines a straight line. This plan of making merely plausible what could easily be proved rigorously is followed in the treatment of maxima and minima. One might question seriously the desirability of trying to find the maximum and minimum values of functions of higher degree than the second by means of elementary algebra. While quadratic functions can be treated rigorously by completing the square (no mention of which is made in the text), the cubics and others will usually present difficulties. When the desired information cannot be obtained accurately by the methods available, we are inclined to doubt the advisability of encouraging the student to guess at results from a picture.

In example 23, page 165, the length of time required to reduce the velocity 2 feet per second should be mentioned. The word "therefore," line 4, page 172, is not justified by the statements which precede it; the theorem in question is not proved for the general case. The word "limit" can scarcely be used with propriety on page 173 when it is not defined until page 176. The expression "about to stop" in example 17, page 173, is too inexact to merit serious criticism. The authors are to be commended for the emphasis placed on the exponential nature of logarithms. The chapter is arranged so as to teach the student to handle logarithmic and exponential equations with equal readiness and to change from one to the other with ease and certainty. The treatment of complex numbers is careful and instructive. That quite erroneous results may be obtained by careless multiplication and division of imaginaries is emphasized and a number of excellent illustrations are given.

J. V. MCKELVEY.

*Le Calcul mécanique.* Par L. JACOB. Paris, Doin et Fils, 1911.  
xvi+412 pp. with 184 figures in the text. 5 fr.

THIS concise presentation of mechanical calculators is the more valuable and interesting to the reader because of the author's style and systematic treatment. The scientific classification follows that adopted in the conferences in 1893 at the Conservatoire des Arts et Métiers held by M. d'Ocagne

and reported in the volume entitled "Calcul simplifié." The several chapters describe instruments having a common purpose or having the same purpose and involving a common mechanical principle. At the end of each chapter there is given an almost complete chronological list of the instruments of the type described therein, with the names of inventors, dates, and frequently a remark to indicate the special characteristic. Frequent references are made to the articles by R. Mehmke and M. d'Ocagne respectively in the German and French editions of the Encyclopedia of Mathematical Sciences (French: tome I, volume 4, fascicule 2), which follow the same classification and supplement the volume under review.

There are treated instruments for the solution of problems of arithmetic, of algebra, and of analysis. These three broad types are further divided into numerous groups and classes, each with its history and development, with a description of the principle involved, a well-marked figure and enough detail, in many instances, at least, to enable even the amateur mechanic to make a similar instrument or machine.

CHARLES C. GROVE.

*Mathematische Theorie der astronomischen Finsternisse.*

By P. SCHWAHN. Leipzig und Berlin, B. G. Teubner, 1910. 128 pp. + 20 figures in the text.

THIS very readable book forms part 8 of Jahnke's "Mathematisch-physikalische Schriften für Ingenieure und Studierende." Its aim is to give to students of natural sciences at large a clear and simple presentation of the theory of the eclipses of the Moon and the Sun, the passages of Mercury and Venus over the disc of the Sun, and the occultations of stars by the Moon. The theory of Bessel, on account of its inherent elegance was certainly best adapted for this purpose and the author has done well to select it in preference to those of Chauvenet and Wollaston. Since the book was not intended to serve as a guide to the astronomer at an almanac office, the author has introduced simplifications, wherever this could be done without injury to the final object the book was written for. The size of the book and the clear presentation of the material will make it a welcome gift to the professional astronomer, especially when reference to Bessel's original or to Chauvenet's more lengthy presentation of Hansen's method is not required. The publishing house of B. G.