SHORTER NOTICES

Geschichte der Elementarmathematik. By Johannes Tropfke. Berlin and Leipzig, Walter de Gruyter. Bd. V: *Ebene Trigonometrie. Sphaerik und Sphaerische Trigonometrie.* i+185 pp. 1923. Bd. VI: *Analysis. Analytische Geometrie.* i+169 pp. 1924.

The fifth and sixth volumes of the revision of Tropfke's history of elementary mathematics maintain the high standard set by the first four volumes*. Here is the same wealth of well-arranged material, the same concise and yet vivid style, the same care in evaluating all the contributions of previous workers in the field. The revision includes large amplifications, as the topics contained in these two volumes of 354 pages were covered in 251 pages of the same size in the first edition. The number of references to the literature in the form of footnotes has been increased from 971 to 1922.

The topics are: Vol. 5, plane trigonometry, pp. 3–98; spherical geometry and trigonometry, pp. 101–185; Vol. 6, series, pp. 3–55; compound interest, pp. 56–62; permutations and probability, pp. 63–74; continued fractions, pp. 74–84; maxima and minima (in elementary geometry), pp. 84–91; analytic geometry, pp. 92–169.

The discussion of analytic geometry is a notable example of the improvement introduced in the new edition. The algebraic–geometric problems of al-Khowarizmi and Abu Kamil are given in some detail; the descriptions of Descartes's *Géométrie* and of Fermat's *Isagoge* have been made somewhat fuller and clearer; and the influence of Descartes's work upon his contemporaries and successors has been traced in a more satisfactory manner.

A detail that is not without general interest is in reference to "Heron's formula" for the area of a plane triangle in terms of its sides: $F=\sqrt{s(s-a)(s-b)(s-c)}$. In the revised edition, Tropfke accepts the statement of an Arab writer of the 11th century† that this formula is not original with Heron, but is due to Archimedes. Heath in his *History of Greek Mathematics*‡ also accepts this statement. In spite, however, of these excellent precedents, and of the fact that there is obviously nothing inherently improbable in the ascription to Archimedes, the reviewer would prefer to await more conclusive evidence before rejecting the tradition which is supported by so many ancient writers, because of this one contrary testimony.

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* Reviewed in this Bulletin, Vol. 29 (1923), pp. 476–477.

† Bibliotheca Mathematica, (3), vol. 11 (1910–11), p. 39.

‡ Vol. 2, p. 322.