

There are a few misprints; in volume 5, p. 61, lines 15 and 16, $\sin 2\alpha$ and $\cos 2\alpha$ should be $\sin \alpha$ and $\cos \alpha$ respectively; p. 74, line 4 from end, *Gegenseiten* should read *Gegenwinkel*; and p. 85, line 16, 1675 should be 1765.

The seventh and final volume is to contain Stereometry and a complete index. The appearance of this index will be impatiently awaited, as it will increase the value of the set many fold. Even as it is, the six volumes are indispensable for the teacher or student of the history of elementary mathematics.

R. B. McCLENON

Principles of Geometry. By H. F. Baker. Vol. II: *Plane Geometry, Circles, Non-Euclidean Geometry.* Cambridge University Press, 1922. xv + 243 pp.

This book, in continuation of the first volume, aims to present the main theorems of plane geometry and to develop logically the results of the principles explained in the first volume. In both purposes the author has succeeded admirably.

The preliminary chapter of the present text reviews in a brief manner enough of the matter of the first volume to enable a reader to use the present volume without reference to the first one, provided he has an elementary knowledge of projective geometry. In both volumes the treatment is first synthetic. The fundamental notation is that of projective, or (as the author calls them) related ranges. The notions of distance and congruence are not assumed. These notions and coordinate systems are developed later with a study of the logical principles underlying them.

In chapter one of the present volume, the general properties of conics are deduced from their definition as the locus of the intersection of the corresponding rays of two projective pencils and a wealth of theorems are presented.

In chapter two the relation of geometric figures to two given points of reference are studied. Let us assume any two points I and J as the absolute. Then if a line AB meets the line IJ in a point K , the point C which is the harmonic conjugate of K with respect to A and B is the midpoint of AB . Two lines which meet on IJ are parallel, and two lines are perpendicular if they meet IJ in two points which are harmonic conjugates with respect to I and J . A circle is a conic through I and J . From these definitions the usual properties of circles are deduced and a discussion of coaxial circles, inversion on a circle and the like are given. Similarly, projective definitions of foci of a conic, of a rectangular hyperbola, of a parabola and the like may be given, and the so-called metrical properties of conics obtained.

In chapter three, under the heading of the equation of a line and of a conic, a coordinate system is for the first time introduced. From the author's viewpoint the use of symbols is unnecessary but is convenient as rendering a demonstration easier to follow. If A, B, C are symbols attached to any three points of a plane, not lying in the same straight line, then any other point P in the plane has a symbol of the form $xA + yB + zC$ where x, y, z are algebraic quantities. This has been shown in volume one as a consequence of postulates of incidence and the theorem of Pappus. Then (x, y, z) or (mx, my, mz) are the coordinates of P . With the coordinates thus introduced the usual analytic geometry is readily developed.

In chapter four there is discussion of the use of imaginary elements in geometry and the logical questions involved.

Chapter five treats of projective measurement of distance and angle with reference to a fundamental conic, and discusses somewhat fully the types of non-euclidean geometry which result.

F. S. WOODS

Mathematical Theory of Life Insurance. By C. H. Forsyth. New York, John Wiley and Sons, 1924. 6 + 74 pp.

Books dealing with the mathematics of finance and life insurance may be divided roughly into two classes: (1) those that present thousands of formulas; (2) those that attempt to select a comparatively few as fundamental. While certain students may learn best from the first type of book, the second type is more attractive and more inspiring. Forsyth's text is of the second type; and in the reviewer's opinion, the selection of topics and formulas to be stressed is decidedly felicitous. The first half of the book presents with great simplicity and directness the rudiments of probability, the mortality table, and the premiums for annuities and insurances. As an analogue for ${}_nE_x$, Forsyth introduces the symbol ${}_nI_x$ as the single premium for insurance covering the n th year only; and thus $A_x = \sum {}_nI_x$, just as $a_x = \sum {}_nE_x$. Chapter IV explains rather briefly but comprehensively the valuation of policies in accordance with the laws of different states, and this chapter is decidedly important. The instructor will have to supplement this to some extent, and may prefer to give the prospective method before the retrospective method. In using the "shuttle" ${}_nE_x$, it should be noted that the " x " refers to the earlier age, not to the age from which the change is made. Chapter V explains in a simple manner the Makeham formula and its use in joint insurance, leaving for the two-page appendix the derivation of the Makeham formula. The American Experience Table is given, with columns for $l_x, d_x, q_x, p_x, e_x, D_x, N_x, M_x$, the three latter on the basis of $3\frac{1}{2}\%$. Numerous exercises appear throughout the text.

E. L. DODD