
This little volume is to be followed by two others, Projektive Geometrie and Einleitung in die höhere Geometrie. In Analytische Geometrie, Bieberbach has produced a volume which the reviewer believes is unique. The subject matter that generally appears in an elementary analytical geometry text is here developed in its entirety by use of vectors, vector notions, and matrices. The treatment is elegant and effective in its simplicity.

The properties of vectors and vector operations are carefully formulated in a set of fifteen axioms. Based on these, analytical geometry of the plane and analytical geometry of ordinary space are developed simultaneously in terms of two and of three unit-vectors, respectively. Many formulas which express geometrical situations in the plane are derived from the corresponding formulas for space by omitting all terms containing the third unit-vector.

The elementary theory of matrices, orthogonalization, transformation of coordinates, transformation of units, and the theory of determinants, all expressed in vector language, lead to the solution of systems of linear equations, to formulas for distance, area, and volume, and to the classification of conics and of quadric surfaces. Displacements, motions, the invariants of motion, some elementary notions of groups as presented by Klein in his Erlanger Programm, these topics of a more advanced character are quite clearly developed in terms of vectors and matrices whose columns (or rows) are looked upon as vectors.

The book abounds in interesting exercises which not only exemplify but "in ihnen schreitet der Gang der Darstellung weiter voran." The author states in his preface that the present volume does not present new material but develops a new method which he will use in the later volumes. He is to be congratulated on his successful accomplishment of his first aim. The appearance of the two other books will be awaited with interest. Will he show us that the vector method can be made as useful and fruitful in the development of pure geometry as in the applications to physics?

This book is well printed on an excellent quality of paper.


This book has been prepared for the use of "candidats au certificat de mathématiques générales et des élèves de mathématiques spéciales." It is assumed that the reader has attended a course of lectures on mechanics and this volume is intended to furnish review and practice material in preparation for the examination.

The first part is devoted to kinematics. After a brief statement of general principles the author has selected forty typical and fundamental problems for detailed discussion. By a similar method the second part covers the subject of the dynamics of a particle. In the third part is given a brief solution of each of the problems which have appeared on the examinations held in Paris, usually in July and October of each year, from 1919 to 1930, inclusive.

Mayme I. Logsdon

W. R. Longley