Analytische Geometrie. By Ludwig Bieberbach. Leipzig, B. G. Teubner, 1932,
(Teubner's mathematische Leitfaden, Bd. 29, Second Edition.) v+141 pp.
Kart. R.M. 5.95.

This little volume is to be followed by two others, *Projektive Geometrie*
and *Einleitung in die höhere Geometrie.* In *Analytische Geometrie,* Bieber-
bach has produced a volume which the reviewer believes is unique. The sub-
ject 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 ex-
pressed 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 de-
velopes a new *method* which he will use in the later volumes. He is to be con-
gratulated 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.

MAYME I. LOGSDON

Problèmes et Compléments de Mécanique. By E. Blanc. Paris, Gauthier-Villars,
1931. 16+287 pp.

This book has been prepared for the use of "candidats au certificat de
mathématiques générales et des élèves de mathématiques spéciales." It is as-
sumed 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.

W. R. LONGLEY