CAMBRIDGE LIBRARY COLLECTION

Books of enduring scholarly value

Mathematical Sciences

From its pre-historic roots in simple counting to the algorithms powering modern desktop computers, from the genius of Archimedes to the genius of Einstein, advances in mathematical understanding and numerical techniques have been directly responsible for creating the modern world as we know it. This series will provide a library of the most influential publications and writers on mathematics in its broadest sense. As such, it will show not only the deep roots from which modern science and technology have grown, but also the astonishing breadth of application of mathematical techniques in the humanities and social sciences, and in everyday life.

Principles of Geometry

Henry Frederick Baker (1866–1956) was a renowned British mathematician specialising in algebraic geometry. He was elected a Fellow of the Royal Society in 1898 and appointed the Lowndean Professor of Astronomy and Geometry in the University of Cambridge in 1914. First published between 1922 and 1925, the six-volume *Principles of Geometry* was a synthesis of Baker's lecture series on geometry and was the first British work on geometry to use axiomatic methods without the use of co-ordinates. The first four volumes describe the projective geometry of space of between two and five dimensions, with the last two volumes reflecting Baker's later research interests in the birational theory of surfaces. The work as a whole provides a detailed insight into the geometry which was developing at the time of publication. This, the third volume, describes the principal configurations of space of three dimensions.

Cambridge University Press has long been a pioneer in the reissuing of out-of-print titles from its own backlist, producing digital reprints of books that are still sought after by scholars and students but could not be reprinted economically using traditional technology. The Cambridge Library Collection extends this activity to a wider range of books which are still of importance to researchers and professionals, either for the source material they contain, or as landmarks in the history of their academic discipline.

Drawing from the world-renowned collections in the Cambridge University Library, and guided by the advice of experts in each subject area, Cambridge University Press is using state-of-the-art scanning machines in its own Printing House to capture the content of each book selected for inclusion. The files are processed to give a consistently clear, crisp image, and the books finished to the high quality standard for which the Press is recognised around the world. The latest print-on-demand technology ensures that the books will remain available indefinitely, and that orders for single or multiple copies can quickly be supplied.

The Cambridge Library Collection will bring back to life books of enduring scholarly value (including out-of-copyright works originally issued by other publishers) across a wide range of disciplines in the humanities and social sciences and in science and technology.

Principles of Geometry

Volume 3: Solid Geometry

H.F. Baker

CAMBRIDGE UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore,
São Paolo, Delhi, Dubai, Tokyo, Mexico City

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9781108017794

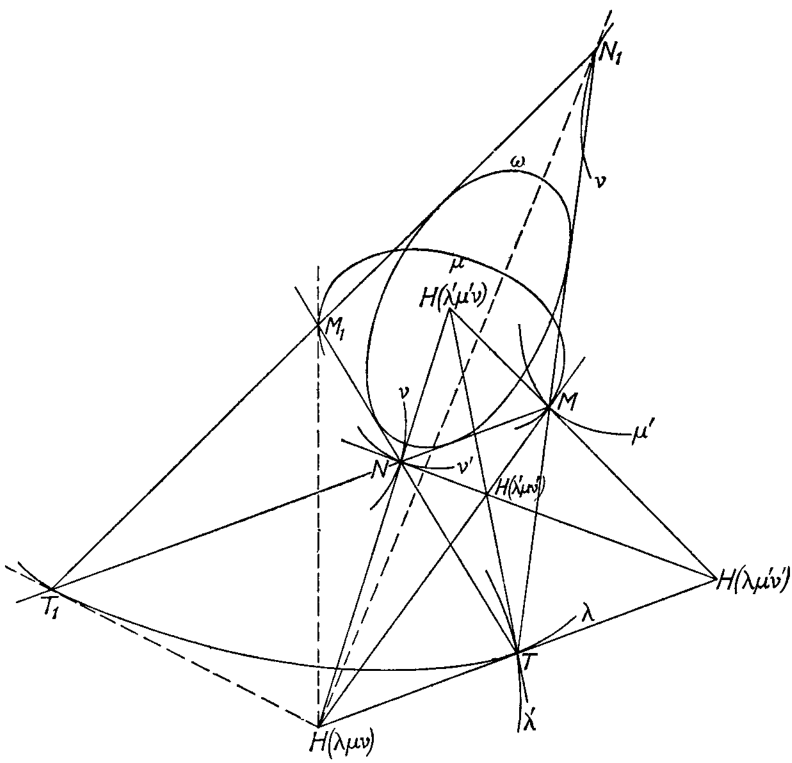
This edition first published 1923
This digitally printed version 2010

ISBN 978-1-108-01779-4 Paperback

PRINCIPLES OF GEOMETRY

CAMBRIDGE UNIVERSITY PRESS
C. F. CLAY, MANAGER
LONDON : FETTER LANE, E.C. 4

LONDON : H K. LEWIS AND CO , LTD.,
136, Gower Street, W.C. 1
NEW YORK · THE MACMILLAN CO.
BOMBAY
CALCUTTA } MACMILLAN AND CO , LTD.
MADRAS
TORONTO : THE MACMILLAN CO OF
CANADA, LTD.
TOKYO : MARUZEN-KABUSHIKI-KAISHA



PONCELET'S PORISM AND CONFOCAL QUADRICS
(see p. 116)

PRINCIPLES OF GEOMETRY

BY

H. F. BAKER, Sc.D., LL.D., F.R.S.,

LOWNDEAN PROFESSOR OF ASTRONOMY AND GEOMETRY, AND FELLOW OF ST JOHN'S COLLEGE, IN THE UNIVERSITY OF CAMBRIDGE

VOLUME III

SOLID GEOMETRY

QUADRICS, CUBIC CURVES IN SPACE, CUBIC SURFACES

CAMBRIDGE
AT THE UNIVERSITY PRESS

1923

PRINTED IN GREAT BRITAIN

PREFACE

THE present volume is devoted to geometry in three dimensions. The discussion of the logical standpoint, to which sufficient space has been given in the preceding volume, is left aside; and, from a desire to limit the size of the volume, many things are omitted which might well have been included. What is given may, however, be regarded as essential to any student who professes to have received a mathematical education. The aptitude for geometrical construction in space, important as it is in the applications of mathematics to physics and engineering, receives, in our educational system at present, less training than it deserves. It is the writer's hope that this volume may help to emphasize this; and may convey to readers something of the fascination and freedom which belongs to the reduction of intricate geometrical relations to the properties of a constructed figure. Only by such methods, moreover, can progress be made beyond the first principles of the subject.

Up to the end of Chapter III, this volume was in type when death severed an association to which the writer owed more help than he can well express. In business, James Bennet Peace was clear and honest; in friendship, constant and self-regardless; many beside the writer deplore his loss. To him, and to the co-operation of the other members of the Staff of the University Press, great acknowledgment is due.

H. F. BAKER.

14 *July* 1923.

Cambridge University Press
978-1-108-01779-4 - Principles of Geometry, Volume 3
H. F. Baker
Frontmatter
More information

"TEODORO REYE, ..., *che avevo cominciato ad ammirare fin da studente, leggendo la sua classica* Geometrie der Lage; *e col quale poi non avevo tardato ad entrare in relazione scientifica, ed anche personale, sì da poter apprezzare, oltre al valore del matematico, la grande bontà d'animo dell'uomo: vero gentiluomo!*

Nato a Cuxhaven il 20 giugno 1838, ..., era passato verso il 1864 ad insegnare nel Politecnico di Zurigo. ......Aveva esordito nella scienza con lavori di Fisica matematica e di Meteorologia. Ma, poichè a Zurigo il corso del Culmann, fondatore della Statica grafica, si basava sulle teorie della Geometria di posizione, e il classico trattato di Staudt era troppo difficile per gli studenti; Reye fu condotto ad insegnare quelle teorie e ad esporle in un nuovo trattato, che uscì in due parti nel 1866 e nel 1868. ....
....

Artista non meno che scienziato, Reye ha molto contribuito a quella grandiosa e pure snella costruzione scientifica che è la Geometria di posizione, introducendo o svolgendo idee semplici e geniali; studiando, com' è carattere di essa, svariate figure in tal maniera da illuminarne di vivida luce le proprietà più profonde, e i legami che le uniscono. Non solo ci ha fatto conoscere nuovi veri; ma ci ha procurato squisiti godimenti estetici, quali solo può dare il bello. Onore e gratitudine a Lui!"

Corrado Segre, *Rendiconti...dei Lincei*, 2 Aprile 1922.

TABLE OF CONTENTS

CHAPTER I. INTRODUCTION TO THE THEORY OF QUADRIC SURFACES

CHAPTER IV. THE GENERAL CUBIC SURFACE; INTRODUCTORY THEOREMS