

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

# SOLID GEOMETRY

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

# SOLID GEOMETRY

BY THE LATE

C. GODFREY, M.V.O., M.A.

AND

A. W. SIDDONS, M.A.

FORMERLY FELLOW OF JESUS COLLEGE, CAMBRIDGE ;  
AND LATE SENIOR MATHEMATICAL MASTER AT HARROW SCHOOL

CAMBRIDGE  
AT THE UNIVERSITY PRESS  
1949

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

**CAMBRIDGE**  
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781316603857](http://www.cambridge.org/9781316603857)

© Cambridge University Press 1949

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First edition 1911

Reprinted 1911, 1914, 1920, 1930, 1936, 1942, 1949

First paperback edition 2016

*A catalogue record for this publication is available from the British Library*

ISBN 978-1-316-60385-7 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

## PREFACE

“It is a great defect in most school courses of geometry that they are entirely confined to two dimensions. Even if solid geometry in the usual sense is not attempted, every occasion should be taken to liberate boys’ minds from what becomes the tyranny of paper.....But beyond this it should be possible, if the earlier stages of the plane geometry work are rapidly and effectively dealt with as here suggested, to find time for a short course of solid geometry. Euclid’s eleventh book is generally found dull and difficult, but all that is of real value in it can be dealt with much more rapidly, especially if full use is made of the idea of the motion of a line or of a plane. Similarly it should be found possible to include a study of the solid figures; this will be much facilitated if their general outlines have been made familiar at the very commencement as is usually the case.”

Board of Education Circular on the teaching of  
Geometry (No. 711, March 1909).

It may be argued that the course of plane geometry gives all the practice necessary in the use of *formal* logic as applied to mathematics, that the course in solid geometry should not aim at giving further practice in formal logic, but rather at imparting the power of ‘thinking in space.’ Whether this argument is sound or not, it is generally found in actual practice that the choice lies between informal solid geometry and no solid geometry at all: there is no time for a course on the lines of Euclid XI. This book is intended to provide an informal course: a few theorems only are treated formally, mainly as illustrations of

Cambridge University Press  
 978-1-316-60385-7 - Solid Geometry  
 C. Godfrey and A. W. Siddons  
 Frontmatter  
[More information](#)

the method to be used in solving such exercises as lend themselves to Euclidean treatment.

The arrangement of the book is as follows :

Chaps. I.—VI. An informal discussion of the main properties of lines and planes.

Chaps. VII.—XIII. Properties of the principal solid figures, including mensuration.

With an average class it may be better to take Chaps. VII.—XIII. before Chaps. I.—VI., referring back to the earlier chapters as occasion arises (e.g. when discussing the inclinations of faces of prism or pyramid, refer back to the section on the inclination of planes).

Chaps. XIV.—XVI. Some account of coordinates in 3 dimensions, plan and elevation, perspective.

The course of work in plan and elevation—sometimes called descriptive geometry—does not profess to give such technical skill as is needed by an architect or engineer. On the other hand, it would be a good introduction to the subject for this class of student. For the general mathematical student, this non-technical course is, we believe, both sufficient and necessary. Under the influence of the new Tripos regulations at Cambridge, simple descriptive geometry must soon enter into the work of the higher classes at schools. And, from an educational standpoint, it is perhaps the best possible subject for developing the space-imagination.

If the aim is educational rather than technical, very accurate drawing is hardly necessary; whatever educational benefit is to be gained from drawing accurately has presumably been gained during the earlier study of plane geometry. But it must be remembered that in some cases a fair degree of accuracy is needed to reveal the essentials, e.g. there are often cases of concurrency or collinearity the failure of which would wreck the figure.

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

## PREFACE

vii

The teacher is recommended to illustrate his lessons with models made of paper, cardboard, string and needle-pointed sticks\* ; with the latter, especially, quite elaborate figures can be built up in a few seconds. The number of figures in the text has been kept down, on the assumption that 3-dimensioned models will be constructed.

The authors have to acknowledge with thanks the courtesy of Mr H. M. Taylor for permission to include some exercises from his edition of Euclid ; of the Controller of H.M. Stationery Office for the use of exercises from Army papers, Science papers (Board of Education), and from the annual reports of the Secondary Education Department for Scotland ; of the Director of Naval Education for the use of questions from various Navy papers.

Exercises that may be treated in a more or less formal and Euclidean style have been marked with a dagger (†).

\* Such sticks as those supplied for the purpose by Mr G. Cussons, The Technical Works, Manchester.

C. G.  
A. W. S.

*October, 1910.*

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---



Cambridge University Press  
 978-1-316-60385-7 - Solid Geometry  
 C. Godfrey and A. W. Siddons  
 Frontmatter  
[More information](#)

## CONTENTS

| CHAP.  | PAGE |
|--|------|
| I. Planes and Lines . . . . .  | 1    |
| II. Parallel positions of Planes and Lines . . . . .                             | 7    |
| III. Perpendicular positions of Planes and Lines . . . . .                       | 11   |
| IV. Oblique positions of Planes and Lines . . . . .                              | 16   |
| V. Skew Straight Lines . . . . .   | 20   |
| VI. Loci . . . . .   | 25   |
| VII. The Prism . . . . .   | 27   |
| VIII. The Cylinder . . . . .   | 33   |
| IX. The Pyramid . . . . .  | 37   |
| X. The Cone . . . . .  | 44   |
| XI. The Sphere . . . . .   | 48   |
| XII. The Solid Angle . . . . .   | 60   |
| XIII. The Regular Solids, the Principle of Duality, Euler's<br>Theorem . . . . . | 65   |
| XIV. Coordinates in Space . . . . .  | 72   |
| XV. Plan and Elevation . . . . .   | 75   |
| XVI. Perspective . . . . .   | 89   |
| MISCELLANEOUS EXERCISES . . . . .  | 93   |
| ANSWERS . . . . .  | 105  |
| INDEX . . . . .  | 107  |

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

Cambridge University Press  
978-1-316-60385-7 - Solid Geometry  
C. Godfrey and A. W. Siddons  
Frontmatter  
[More information](#)

---

*† indicates that an exercise is suitable for formal treatment,  
on Euclidean lines.*