PREFACE

"If you want to learn a subject, teach it," and "If you want to learn a subject, write a book on it." Both are very sound pieces of advice; but, as far as Elementary Solid Geometry is concerned, they have not been hitherto very easy to carry out. The would-be learner should have access to the great fund of information that exists as the outcome of centuries of work and of the ideas of many a genius; he must be able to apply what he has learnt to everyday problems (always increasing in number with the advance of knowledge); he must have experience as well and plenty of time at his disposal. Access of a kind there has doubtless been for a long while, but the stores of information are either contained in many books, none of them fully intelligible alone, or else concentrated as in an Encyclopaedia in a bulky and costly form: and, though countless examples may be culled from Nature and from everyday affairs, yet it is extremely easy to pass them by unseen. There is therefore still something wanting, which it is hoped that this volume will supply.

My object is to present elementary features of Solid Geometry, with many ideas as to their application, in the hope that the practice will help to find other uses for the truths, which have been known so long and yet are always fresh.

The subject is developed both from the practical and theoretical point of view. Reference is made continually to the historical side. In the specimen examples the tendency has been to note how the ground should be prepared for the solution of the problem, by this means emphasizing the necessary lines of attack. There
are 10 propositions and about 450 examples (the scope of which is indicated by the following rough summary):

- 5% Plans and Elevations (G.D.),
- 35% Special cases (G.D. or Calculations),
- 38% General cases (Theoretical Calculations),
- 22% Riders.

They have been very clearly graded. There are no hard and fast lines as to the beginning and end of the subject, so certain sections of it, about the inclusion of which opinions may differ, are given in Appendices I. and II.; in the former is a note on some ways of showing relief, in the latter are five propositions somewhat on the border line. The determination of the particular style of the diagrams, which are a feature of the book, has been difficult in many cases. Unquestionably models convey correct ideas of 3 dimensions much more quickly to the eye than pictures on flat paper (necessarily in 2 dimensions); but their use is impracticable in a text-book. It is possible to adopt various plans on stereoscopic principles, with special instruments for viewing every figure, but these are more likely to excite wonder by their realism than to afford any genuine aid in the acquisition of the habit (so essential to the student of Solid Geometry) of imagining, and also depicting, space by flat diagrams alone. Here shading and colour help; however their reproduction requires some artistic skill and is quite prohibitive in the matter of cost: this alternative is seldom used. In certain cases the camera has been of service, and reproductions of photographs are given on several occasions. The adoption of lines of different thicknesses conveys some idea of solidity, while conventional lines of shading are frequently inappropriate. In some figures the important lines have been emphasized.

My thanks are due to the Controller of His Majesty’s Stationery Office for permission to include some questions from recent Army Entrance Examination Papers. The advice of Mr. A. R. Hinks, Mr. A. L. Onslow and Mr. B. V. Slater, on various points, has
been of great benefit. I am indebted to Mr. D. F. Landale for a paper model of a regular icosahedron, from which the photograph on page 165 was made. The criticisms of Mr. F. W. Dobbs and Mr. W. D. Eggar have been most valuable. Many others have consciously, or unconsciously, given me information and ideas; to them I am very grateful, and amongst these I should mention (especially) important officials in the Cunard Steamship Company and the L. & N.W. Railway Company. Again, in the production of this volume, as well as of its predecessors, I owe an enormous debt of gratitude to Mr. W. Hope-Jones, who throughout has placed his knowledge at my disposal, has frequently bestowed considerable labour on a diversity of affairs, has criticised in very great detail, and has ended by checking every answer. To the careful and thorough revision, and suggestions, of the General Editor I should like to pay a warm tribute; and last, but not least, I am much beholden to the Publishers, who have had far from an easy task.

V. L. N. F.

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