A MANUAL OF DESCRIPTIVE GEOMETRY, WITH NUMEROUS PROBLEMS

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BY

CLARENCE A. WALDO, A.M.,

PROFESSOR OF MATHEMATICS, PURDUE UNIVERSITY,
LAFAYETTE, IND.

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PREFACE.

DESCRIPTIVE GEOMETRY gives power to express conceptions and to solve problems in the constructive arts; it also effectively disciplines the geometrical imagination.

To accomplish these ends, nothing is better than problems of progressive difficulty, which, taken in their logical order, the student can master alone, or with the aid of a small amount of judicious suggestion, and this principle has controlled the plan of this book. Part I., therefore, consists exclusively of problems systematically arranged. The Introduction should be read before the student undertakes to solve these, as it is not intended for recitation, but for a preparatory lecture and for reference. It is not expected that any student will solve all the problems, nor would it be a wise expenditure of time. A course has been laid down, — by no means a minimum one, — and in Part II. of the book, suggestions, analyses, and occasional demonstrations for the solution of the problems of this course have been given, with the intention, however, of always leaving some real work for the student. A large number of additional problems have been stated, which can be substituted at will for the others or can be used independently. Such combinations of the problems can be readily formed that the instructor may have from year to year the substantial advantages of a change of text-book.

Part III. is a condensed statement designed for occasional reference in the earlier part of the work, but especially as a review before leaving the subject or in preparing for examination.

In using the material provided in this book, the author has found a method somewhat as follows productive of the best results: Out of every three exercises, one, an hour in length, is spent with the class in explaining difficulties, in opening new phases of the subject, and in pointing out short and elegant methods of solution, based as far as possible upon the discoveries of the class. As often as seems necessary, analyses and geometrical reasons are called for. The other two exercises, each two hours in length, are spent by the students in work under the eye of the instructor, in solving and reporting problems, and receiving such assistance as seems necessary or judicious.

When the constructions have been approved, the student copies and arranges them, and prepares a suitable index and title-page. The set of solutions thus formed is then permanently bound, and in the end becomes the property of the student who makes it.

The following are the special features of the book:

First. The method of unfolding the subject by problems systematically arranged, and supplemented by suggestions when needed.

Second. The large number of problems given.

Third. The method of stating the problems, which in connection with the notation adopted makes every lettered drawing entirely self-explanatory.

Fourth. The introduction of several subjects of considerable descriptive value, such as the axis of affinity, axonometry, Pascal's and Brianchon's hexagrams.

Fifth. The early discussion of the cone and cylinder of revolution, and the sphere, in order that from the beginning these surfaces may be used as auxiliary.

Sixth. The omission of all plates except a few of a generic character.

It has been the intention of the author to prepare a book that will stimulate the student and can safely be left in his hands at all times, in the same way that a book of directions may be left in the hands of a student in a zoölogical laboratory. It is hoped that any one of three classes of teachers of the subject will find it serviceable:

First. Those who believe it necessary to continue the methods of demonstration peculiar to Ancient Geometry through the course in Descriptive Geometry, but wish to supplement this work with practical exercises.

Second. Those who prefer the lecture system rather than the use of text-books, but desire a book of exercises for the systematic grounding of their students in the elements.

Third. Those who try to find in these pages all they need for a short, thorough course in the fundamental principles of Descriptive Geometry.

The book is intended for the class-room, but it is believed that the industrious student will be able to master it by himself.

Several books in German have been freely drawn upon for problems, though many of them were collected while the author was attending a course of lectures upon the subject, by Professor Marx, of the Royal Polytechnic School at Munich, and some are entirely original. All, however, have been rearranged and recast to suit the requirements of the present work. Pohlke has been freely consulted in the preparation of

Part III., though the works of De la Gournerie, Mannheim, Delabar, Gugler, Fiedler, Steiner and others have been at hand for reference.

I wish to express my thanks to Pres. T. C. Mendenhall, of the Rose Polytechnic Institute, and to my associate in the Faculty, Prof. W. L. Ames, of the department of Mechanical Drawing, both of whom read my manuscript and made valuable and helpful suggestions; also to Mr. E. G. Waters, a student of Rose Polytechnic, who has aided me in the preparation of the plates for this work.

C. A. WALDO.

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