ELEMENTS OF DESCRIPTIVE GEOMETRY, WITH ITS APPLICATIONS TO SPHERICAL PROJECTIONS, SHADES AND SHADOWS, PERSPECTIVE AND ISOMETRIC PROJECTIONS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649211142

Elements of descriptive geometry, with its applications to spherical projections, shades and shadows, perspective and isometric projections by Albert E. Church

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

ALBERT E. CHURCH

ELEMENTS OF DESCRIPTIVE GEOMETRY, WITH ITS APPLICATIONS TO SPHERICAL PROJECTIONS, SHADES AND SHADOWS, PERSPECTIVE AND ISOMETRIC PROJECTIONS

Trieste

ELEMENTS

OF

DESCRIPTIVE GEOMETRY,

WITH ITS APPLICATIONS TO

SPHERICAL PROJECTIONS, SHADES AND SHADOWS, PERSPECTIVE AND ISOMETRIC PROJECTIONS.

BY

ALBERT E. CHURCH, LL. D.,

PROFESSOR OF MATHEMATICS IN THE U. S. MILITARY ACADEMY, AUTHOR OF ELEMENTS OF THE DIFFERENTIAL AND INTEGRAL CALCULUS, AND OF ELEMENTS OF ANALYTICAL GEOMETRY.

A. S. BARNES & COMPANY,

NEW YORK AND CHICAGO.

1872.

Valuable Works by Leading Authors

IN THE

HIGHER MATHEMATICS.

A. E. CHURCH, LL.D.,

Prof. Mathematics in the U. S. Military Academy, West Point.

CHURCH'S ANALYTICAL GEOMETRY.
CHURCH'S CALCULUS.
CHURCH'S DESCRIPTIVE GEOMETRY

EDWARD M. COURTENAY, LL.D.,

Late Prof. Mathematics in the University of Virginia.

COURTENAY'S CALCULUS.

CHAS. W. HACKLEY, S. T. D.,

Late Prof. of Mathematics and Astronomy in Columbia College.

HACKLEY'S TRIGONOMETRY.

W. H. C. BARTLETT, LL.D.,

Prof. of Nat. & Exp. Philos. in the U. S. Military Acad., West Point.

BARTLETT'S SYNTHETIC MECHANICS.
BARTLETT'S ANALYTICAL MECHANICS.
BARTLETT'S ACOUSTICS AND OPTICS.
BARTLETT'S ASTRONOMY.

DAVIES & PECK,

Department of Mathematics, Columbia College.

MATHEMATICAL DICTIONARY.

CHARLES DAVIES, LL.D.,

Late of the United States Military Academy and of Columbia College.

A COMPLETE COURSE IN MATHEMATICS.

See A. S. Barnes & Co.'s Descriptive Catalogue.

Entered, according to Act of Congress, in the year 1864, by
BARNES & BURR,
In the Clerk's Office of the District Court of the United States for the Southern District of New York.

C. D. G.

PREFACE.

These pages have been written and are published with the single object of presenting, in proper form to be used as a text-book, the course of Descriptive Geometry, as taught at the U. S. Military Academy.

Without any effort to enlarge or originate, the author has striven to give, with a natural arrangement and in clear and concise language, the elementary principles and propositions of this branch of science, of so much interest to the mathematical student, and so necessary to both the civil and military engineer.

Though indebted for many of the ideas to the early instructions of his predecessor and friend, Professor Davies, whose text-books on this subject were among the first in the English language, the author has been much aided by a frequent reference to the French works of Leroy and Olivier, and to the elaborate American work of Professor Warren.

It is intended to include, in an edition to be issued at an early day, the application of the subject to shades and shadows, and perspective.

U. S. Military Academy,
October, 1864

CONTENTS.

PART I.

ORTHOGRAPHIC PROJECTION.

	PAGE
Preliminary definitions	1
Representation of points	2
Representation of planes	4
Representation of right lines	5
Revolution of objects	7
Revolution of the vertical plane	8
Notation used in the description of drawings	12
Manner of delineating the different lines used	12
Elementary problems relating to the right line and plane	13
Construction and classification of lines	33
Projection of curves	36
Tangents and normals to lines	37
Generation and properties of the helix	39
Generation and classification of surfaces	40
Generation and properties of cylindrical surfaces	42
Generation and properties of conical surfaces	44
Warped surfaces with a plane director	47
Generation and properties of the hyperbolic paraboloid	49
Warped surfaces with three linear directrices	51
Generation and properties of the helicoid	53
Surfaces of revolution	54
The hyperboloid of revolution of one nappe	56
Tangent planes and surfaces; normal lines and planes	61
Problems relating to tangent planes to single curved surfaces	66
Problems relating to tangent planes to warped surfaces	74
Problems relating to tangent planes to double curved surfaces	78
Points in which surfaces are pierced by lines	85
Intersection of surfaces by planes. Development of single curved surfaces	86

PAGE
Intersection of curved surfaces 99
Development of an oblique cone 104
Practical problems 107

PART II.

SPHERICAL PROJECTIONS.

Preliminary definitions 113
Orthographic projections of the sphere 116
Stereographic projections of the sphere 121
Globular projections 130
Gnomonic projection 131
Cylindrical projection 132
Conic projection 133
Construction of maps 134
Lorgna's map 135
Mercator's chart 135
Flamstead's method 137
The Polyconic method 138

PART III.

SHADES AND SHADOWS.

Preliminary definitions 140
Shadows of points and lines 142
Brilliant points 145
Practical problems 147

PART IV.

LINEAR PERSPECTIVE.

Preliminary definitions and principles 157
Perspectives of points and right lines. Vanishing points of right lines. 158
Perspectives of curves 162
Line of apparent contour 163

PAGE
Vanishing points of rays of light and of projections of rays..... 164
Perspectives of the shadows of points and right lines on planes 165
Practical problems..... 167

PART V.

ISOMETRIC PROJECTIONS.

Preliminary definitions and principles..... 186
Isometric projections of points and lines..... 188
Practical problems..... 189