

**PRACTICAL GEOMETRY: A
COURSE OF CONSTRUCTION OF
PLANE GEOMETRICAL FIGURES,
FOR THE USE OF ART-SCHOOLS**

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Practical Geometry: A Course of Construction of Plane Geometrical Figures, for the Use of Art-Schools by R. Burchett

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PRACTICAL GEOMETRY.

A COURSE OF CONSTRUCTION

OR

PLANE GEOMETRICAL FIGURES,

FOR THE USE OF ART-SCHOOLS.

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NINTH EDITION.

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CHAPMAN AND HALL, 183, PICCADILLY.

1887.

INTRODUCTION.

THE collection of Practical Geometry, here presented to the public, was first brought together for the use of students in training for Art-Masterships, in connexion with the Science and Art Department; the method of teaching adopted being that of Lecture, with the drawings made on the Black Board by the teacher; the students making notes at the time, and afterwards making careful drawings with the necessary written descriptions.

The superiority of this method of teaching, over that of placing sheets of geometric figures with printed descriptions before a student, and allowing him to *copy* both, need not be enlarged upon here; to extend this method of oral teaching is the principal object sought to be promoted by the publication of the course.

Added to this, a necessity has arisen for placing the entire course within the reach of all students of Art-Schools and others, who, for the purposes of Art or

Trade, require ready practical methods of constructing geometrical figures.

It is hoped also that the present collection may form a useful and ready book of reference to many who, in various branches of trade and manufacture, would be greatly advantaged by a knowledge of Practical Geometry, especially of those portions which apply to the construction and combination of symmetrical figures.

It is proper at once to announce that the work is *descriptive*, not *demonstrative*; several years' experience having furnished ample proof, that although it is necessary that the students of our schools should know how to construct Plane Geometric figures, it is vain, as it is perhaps unnecessary, to hope that they will become mathematicians; their want of preliminary training, and the amount of time necessary, rendering such a result an impossibility.

But this should not prevent the teacher from occasionally employing demonstration according to his ability, rather as an incentive to some than as a necessity to all. In all applications of Science to Art, we may be certain that many more will learn *how* to do, than *why* it is done.

As this work has been preceded by an "Introduction to the Study of Plane Geometric Figures," containing all necessary definitions, &c., none are given in the present work, the student being supposed to be fully acquainted with them.

This course is divided into three sections:—

1. The construction of single figures.
2. The combination of figures.
3. The transformation of figures and quantities.

At the *commencement* of each section will be placed such elementary figures as are necessary to the construction of the figures included in it, and no more.

This method has this advantage—the student is not kept working a number of elementary problems of which he cannot discover the use, and which it is most likely he will forget before he has an opportunity of applying them; but, having drawn a few elementary figures, he sees at once their use, and, by their frequent application, impresses them more fixedly in his mind.

As a work of reference, this method has also the advantage of supplying more readily the information sought than an undivided work.

It has been the endeavour to make this course of the construction of Plane Geometrical figures full and complete, without being *limited* or *overloaded* by the requirements of any specialty, to impart to the students of the schools a knowledge useful in every branch of Art, and only so frequently unapplied from being so commonly unknown.

In the constructive problems of the first section it has been desired to place before the student methods that should meet every condition under which the construction of regular plane geometrical figures could be required of him, from knowing well that, to many, a proposition, differing in any degree in its conditions

from one previously known, presents insuperable difficulties.

In the construction of Polygons, an effort has been made to complete the series from a five to an eleven-sided polygon, both inscribed and constructed.

Another class of figures, of great use in Ornamental Art, Ovals, has been introduced—it is hoped not without advantage: one method by which every variety of ovoid form may be described to given dimensions, admits of numberless applications in practice; and it is hoped that this course may both enrich the memory and stimulate the inventive powers of the students.

In the constructive problems of the second section it has been an endeavour to place before the student means for the extensive combination of regular geometric figures with each other; the infinite applications of these figures to the requirements of Art and Industry must alike excuse their copiousness and their possible deficiency, for whilst to some it may appear that more are given than are often needed, it is quite possible that wants may exist not suppliable by these figures.

Having in the first section given means for the construction of single figures; in the second, for their combination with each other; the third section is devoted to the conversion or transformation of figures into others, equal to them in area, &c.: the elementary problems of this section will relate, therefore, to the measurement of surfaces, &c.

In such a work selection will, of course, supply the

bulk of the material ; in the present course it is believed, however, that many are new, and these, it is hoped, may be found useful.

The student seeking to learn is strongly advised to draw his figures large ; say, for each line one inch long in the plates, to draw one three inches long himself, and, instead of *copying* the description, to write one of his own, and then compare them.

It is also carefully to be borne in mind that the utmost neatness and care is essential to success in drawing Geometrical Figures ; without these, errors will constantly arise, confusing the student, and rendering him doubtful of the truth of the method given, but really resulting from his own carelessness and want of precision.

It has been sought to make the descriptions as terse and brief as consistent with explanation, from a belief that a loose colloquial style, while seemingly intended to aid the understanding, tends really to confuse it.

The works of Pasley on Practical Geometry, and of Baron Dupin on the Application of Geometry to the Arts, will furnish most valuable aids to those who may wish to pursue still further the study and application of Practical Geometry.

January 31st, 1860.

NOTICE.

THIS work on *Practical Geometry* was prepared to supply the wants of the Mechanic, the Artisan, the Art-workman, and the Designer, in their various requirements of Modes for constructing regular Geometrical figures by rule and compass.

Some of the constructions are not mathematically true, but they are given because of their great practical utility. In some cases being better modes of constructing the figures than others which, though mathematically correct, from the difficulty of practically working the construction, are less applicable.

Some of these constructions have been adopted from works that have been in use for nearly two hundred years, and others from later though standard works. For example, the Treatise in Ward's "Mathematics," the "Traité des Pratiques Géométrales" (very useful for those who desire to excel in the Arts, and others who employ the rule and the compass), by A. Bosse, Paris, 1665.

"Cours Élémentaire," the "Origine et Pratique de Dessin Linéaire," by A. Bardon, Paris, 1839, and others.