

**BONNYCASTLE'S INTRODUCTION TO
ALGEBRA: CONTAINING THE INDETERMINATE
AND DIOPHANTINE ANALYSIS, AND
THE APPLICATION OF ALGEBRA TO
GEOMETRY, WITH A LARGE COLLECTION OF
PROBLEMS FOR EXERCISE, PP. 1-283**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649075874

Bonnycastle's Introduction to Algebra: Containing the Indeterminate and Diophantine Analysis, and the Application of Algebra to Geometry, with a Large Collection of Problems for Exercise, pp. 1-283 by J. Bonnycastle & J. Ryan & J. F. Jenkins

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

J. BONNYCASTLE & J. RYAN & J. F. JENKINS

**BONNYCASTLE'S INTRODUCTION TO
ALGEBRA: CONTAINING THE INDETERMINATE
AND DIOPHANTINE ANALYSIS, AND
THE APPLICATION OF ALGEBRA TO
GEOMETRY, WITH A LARGE COLLECTION OF
PROBLEMS FOR EXERCISE, PP. 1-283**

WILLIAM E. DEAN,
PRINTER AND PUBLISHER,

No. 2 ANN STREET, NEW YORK,

OFFERS TO THE TRADE IN QUANTITIES THE FOLLOWING
CLASSICAL AND SCHOOL BOOKS.

- INFANT THERAPEUTICS: by John B. Beck, M. D.
NELIGAN'S MATERIA MEDICA: by Prof. McCready, M. D.
RYAN'S ALGEBRA. 12mo.
SCOTT'S COMMENTARIES ON THE BIBLE, 3 vols. Royal Octavo.
LEMPRIERE'S CLASSICAL DICTIONARY; containing the principal Names and Terms relating to the Geography, Topography, History, Literature, and Mythology of the Ancients. Revised, corrected, and arranged in a new form, by Lorenzo L. da Ponte and John D. Ogilby. 8vo.
ADAMS' ROMAN ANTIQUITIES; a new Edition, from a late English Copy, illustrated with upwards of 100 Engravings on steel and wood, with notes and improvements, by L. L. da Ponte, Editor of the Seventh, Eighth, Ninth, and Tenth American Editions of Lempriere's Classical Dictionary.
LATIN READER; Parts I. & II. by Frederick Jacobs and Frederick William Dörfling; with Notes and Illustrations, partly translated from the German and partly drawn from other sources. By John D. Ogilby. 12mo.
MAIR'S INTRODUCTION TO LATIN SYNTAX; from the Edinburgh Stereotype Edition; revised and corrected by A. R. Carson, Rector of the High School of Edinburgh. To which is added, Copious Exercises upon the Declinable Parts of Speech, and an Exemplification of the several Moods and Tenses. By David Paterson, A. M. 12mo.
ADAMS' LATIN GRAMMAR; with numerous expansions and Additions, designed to make the work more elementary and complete, and to facilitate the acquisition of a thorough knowledge of the Latin Language. By James D. Johnson, A. M. 12mo.
SALLUST; with English Notes. By Henry R. Cleveland, A. M. 12mo.
PLAYFAIR'S EUCLID; a New Edition, revised and corrected; for the use of Schools and Colleges in the United States. By James Ryan.
LEE'S PHYSIOLOGY. 12mo.
COFFIN'S NATURAL PHILOSOPHY, with Questions for Practice, Experiments and Questions for Recitation.
BONNYCASTLE'S ALGEBRA; with Notes and Observations, designed for the use of Schools. To which is added, an Appendix on the Application of Algebra to Geometry. By James Ryan. Also, a large collection of Problems for exercise, original and selected. By John F. Jenkins, A. M. 12mo.
KEY TO BONNYCASTLE'S ALGEBRA; containing correct Solutions of all the Questions. By James Ryan. 18mo.
JACOBUS GREEK READER; Corrected and Improved, with numerous Notes, Additions, and Alterations, not in any former edition, also a copious Lexicon. By Patrick S. Casserly, T. C. D. 8vo.

- CASSERLY'S TRANSLATION TO JACOB'S GREEK READER;** for the use of Schools, Colleges, and private lessons, with copious notes, and a complete Parsing Index. 12mo.
- LEUSDEN'S GREEK AND LATIN TESTAMENT.** 12mo.
- GRECA MINORA;** with extensive English Notes and a Lexicon.
- VALPY'S GREEK GRAMMAR;** greatly enlarged and improved, by Charles Anthon, LL. D. 12mo.
- BECK'S CHEMISTRY;** a new and improved edition.
- THE SCHOOL FRIENDS.** By Miss Robbins. 18mo.
- LEVIZAC'S FRENCH GRAMMAR;** revised and corrected by Mr. Stephen Pasquier, M. A. With the Voltairean Orthography, according to the Dictionary of the French Academy. 12mo.
- CHRESTOMATHE DE LA LITTÉRATURE FRANÇAISE,** &c. By C. Ladvocat. 12mo.
- RECUEIL CHOISI de Traits Historiques et de Contes Moraux;** with the signification of Words in English at the bottom of each page; for the use of Young Persons of both Sexes, by N. Wagnoncourt. Corrected and enlarged, with the Voltairean Orthography, according to the Dictionary of the French Academy, by Paul Moates. 12mo.
- HISTORY OF CHARLES XII.,** in French, by Voltaire. 18mo.
- LE BRETHON'S FRENCH GRAMMAR;** especially designed for persons who wish to study the elements of that language. First American from the seventh London edition, corrected, enlarged and improved; by P. Beloeil. 1 vol. 12mo.
- SIMPLE AND EASY GUIDE TO THE STUDY OF THE FRENCH GRAMMAR.** By Wm. P. Wilson. 12mo.
- FRENCH COMPANION,** consisting of familiar conversations on every topic that can be useful; together with models of letters, notes and cards. The whole exhibiting the true pronunciation of the French Language, the silent letters being printed in Italic throughout the work. By Mr. De Rouillon. Second American, from the tenth London edition. By Prof. Morris. 1 vol. 18mo.
- BLACKSTONE'S COMMENTARIES on the Laws of England;** with Notes by Christian, Ostry, Lee, Hayndon, and Ryland. Also, a life of the Author, and References to American Cases. By a member of the New York bar. 2 vols. 8vo.
- DUBLIN PRACTICE OF MIDWIFERY,** with Notes and Additions. By Dr. Gibson. 12mo.
- BLAIR'S LECTURES ON RHETORIC;** abridged, with questions for the use of Schools. 15mo.
- ENGLISH HISTORY;** adapted to the use of Schools, and young persons. Illustrated by a map and engravings, by Miss Robbins. Third edition. 1 vol. 12mo.
- ENGLISH EXERCISES;** adapted to Murray's English Grammar, consisting of Exercises in Parsing, Instances of False Orthography, violations of the Rules of Syntax, Defects in Punctuation; and violations of the Rules respecting Perspicuous and Accurate Writing. Designed for the benefit of private learners, as well as for the use of Schools. By Lindley Murray. 18mo.
- RYAN'S ASTRONOMY** on an improved plan, in three Books; systematically arranged and scientifically illustrated with several cuts and engravings, and adapted to the instruction of youth, in Schools and Academies. 18mo.
- MYTHOLOGICAL FABLES;** translated by Dryden, Pope, Congreve, Addison, and others; prepared expressly for the use of Youth. 12mo.
- YOUTH'S PLUTARCH,** or Select Lives of Greeks and Romans. By Miss Robbins. 18mo.

Dean's Stereotype Edition.

BONNYCASTLE'S
INTRODUCTION TO ALGEBRA;
CONTAINING THE
INDETERMINATE AND DIOPHANTINE
ANALYSIS,
AND THE
APPLICATION OF ALGEBRA TO GEOMETRY.

REVISED, CORRECTED AND ENLARGED

By JAMES RYAN

AUTHOR OF "AN ELEMENTARY TREATISE ON ALGEBRA THEORETICAL
AND PRACTICAL" &c.

TO WHICH IS ADDED

A LARGE COLLECTION OF PROBLEMS FOR EXERCISE,
ORIGINAL AND SELECTED,

By JOHN F. JENKINS, A.M.,

PRINCIPAL OF THE MECHANICS SOCIETY SCHOOL.



NEW YORK:
W. E. DEAN, PRINTER & PUBLISHER,
2 ANN STREET.

1861.

Entered according to the Act of Congress in the year 1843, by W. E. Deas, in
the Clerk's office of the District Court of the Southern District of New York.

ADVERTISEMENT

TO

THE SECOND NEW YORK EDITION.

It would be superfluous to advance any thing in commendation of "Bonycastle's Introduction to Algebra," as the number of European editions, and the increase of demand for it since its publication in this country, are sufficient proofs of its great utility.

But to make it universally useful both to the tutor and scholar, I have given, in this edition, the answers that were omitted by the author in the original.

In the course of the work, particularly in Addition, Subtraction, Multiplication, Division, Fractions, Simple Equations, and Quadratics, I have added a great variety of practical examples, as being essentially necessary to exercise young students in the elementary principles.

Several new rules are introduced, those of principal note are the following: Case 12. Surds, containing two rules for finding any root of a Binomial Surd, the Solution of Cubics by Converging Series, the Solution of Biquadratics by Simpson's and Euler's methods: all these rules are investigated in the plainest manner possible, with notes and remarks, interspersed throughout the work, containing some very useful matter.

There is also given all the Diophantine Analysis, contained in Bonycastle's Algebra, Vol. I. 8vo. 1820, being a methodical abstract of this part of the science, which comprehends most of the methods hitherto known for resolving problems of this kind, and will be found a ready compendium for such readers as may acquire some knowledge of the ANALYTIC ART.

JAMES RYAN.

New York, January 1, 1823.

PREFACE.

The powers of the mind, like those of the body, are increased by frequent exertion; application and industry supply the place of genius and invention; and even the creative faculty itself may be strengthened and improved by use and perseverance. Uncultivated nature is uniformly rude and imbecile, it being by imitation alone that we at first acquire knowledge, and the means of extending its bounds. A just and perfect acquaintance with the simple elements of science, is a necessary step towards our future progress and advancement; and this assisted by laborious investigation and habitual inquiry, will constantly lead to eminence and perfection.

Books of rudiments, therefore, concisely written, well digested, and methodically arranged, are treasures of inestimable value; and too many attempts cannot be made to render them perfect and complete. When the first principles of any art or science are firmly fixed and rooted in the mind, their application soon becomes easy, pleasant and obvious; the understanding is delighted and enlarged; we conceive clearly, reason distinctly, and form just and satisfactory conclusions. But, on the contrary, when the mind, instead of reposing on the stability of truth and received principles, is wandering in doubt and uncertainty, our ideas will necessarily be confused and obscure; and every step we take must be attended with fresh difficulties and endless perplexity.

That the grounds, or fundamental parts of every science, are dull and unenterprising, is a complaint universally made, and a truth not to be denied; but tamen, what is obtained with difficulty is usually remembered with ease; and what is purchased with pain is often possessed with pleasure. The seeds of knowledge are sown in every soil, but it is by proper culture alone that they are cherished and brought to maturity. A few years of early and assiduous application never fails to procure us the reward of our industry; and who is there, who knows the pleasures and advantages which the sciences afford, that would think his time, in this case, misspent, or his labours useless? Riches and honours are the gift of fortune, casually bestowed, or hereditarily received, and are frequently abused by their possessors; but the superiority of wisdom and knowledge is a pre-eminence of merit, which originates with the man, and is the noblest of all distinctions.

Nature, bountiful and wise in all things, has provided us with an infinite variety of scenes, both for our instruction and entertainment; and, like a kind and indulgent parent, admits all her children to an equal participation of her blessings. But as the modes, situations, and circumstances of life are various, so accident, habit, and education, have each their predominating influence, and give to every mind its partic-