AN ELEMENTARY TREATISE ON ALGEBRA: IN WHICH THE PRINCIPLES OF THE SCIENCE ARE FAMILIARLY EXPLAINED, AND ILLUSTRATED BY NUMEROUS EXAMPLES

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649053711

An Elementary Treatise on Algebra: In Which the Principles of the Science Are Familiarly Explained, and Illustrated by Numerous Examples by Samuel Alsop

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

SAMUEL ALSOP

AN ELEMENTARY TREATISE ON ALGEBRA: IN WHICH THE PRINCIPLES OF THE SCIENCE ARE FAMILIARLY EXPLAINED, AND ILLUSTRATED BY NUMEROUS EXAMPLES

Trieste

T Dwight Townsend

AN

ELEMENTARY TREATISE

ON

ALGEBRA,

IN WHICH

THE PRINCIPLES OF THE SCIENCE

ARE

FAMILIARLY EXPLAINED, AND ILLUSTRATED BY NUMEROUS EXAMPLES.

Designed for the Use of Schools.

BY SAMUEL ALSOP,

PRINCIPAL OF FRIENDS' SELECT SCHOOL, PHILADELPHIA.

PHILADELPHIA:

E. C. & J. BIDDLE, No. 6 S. FIFTH ST.

STEREOTYPED BY L. JOHNSON & CO.

1846.

A Key to this work will shortly be published.

STEREOTYPED BY L. JOHNSON & CO.
PHILADELPHIA.
T. K. & P. G. COLLINS, PRINTERS.

PREFACE.

ALGEBRA is justly considered one of the principal foundations of all sound mathematical knowledge. Since the investigations of modern geometers have given to analytical investigations that predominance which they now hold over the synthetical methods adopted by ancient mathematicians, its importance has proportionably increased. Every person, therefore, who wishes to obtain a thorough knowledge of the higher mathematics, must commence by studying and fully mastering the principles of Algebra.

It is not to such persons alone that it is important. The habits of investigation to which it leads; the powers of analysis which it confers; and its general application to the solution of problems, which are frequently presented to every person who lays any claim to a liberal education, make it an important, if not an essential branch of education.

The object of this treatise is to present the science in a manner sufficiently simple to enable all to understand it, and yet so comprehensive as to embrace nearly every thing that it is necessary for the student to learn, as a preparation for his future studies. The first part of the work, which includes Quadratic Equations, will be found to be more full than common, particularly on the subject of pure equations. It is believed to contain all that is

required, for one who desires to obtain a knowledge of the more elementary parts of Algebra. The remaining chapters contain the theory of Equations, Series, Logarithms, Indeterminate and Diophantine Analysis.

Most teachers have found that children commencing the study of Algebra are frequently at a loss to understand the nature of the operations they are required to perform. The addition and subtraction of letters seem to them foolishness. Some preliminary exercise is necessary to enable them to perceive the utility of their labours. It is hoped the preliminary chapter in this work will do something towards removing this inconvenience. The questions selected are so simple that no child who is prepared to commence the study of Algebra will find much difficulty in performing them; no operations being necessary but such as the method of instruction universally practised by all thorough teachers of arithmetic will have rendered familiar. In solving the various questions that are found in this chapter, the student can hardly fail to become familiar with the meaning and use of the symbols; and thus be prepared to enter upon the subsequent portions of the work, without that embarrassment to which allusion has been made. It is earnestly recommended that he be made fully acquainted with this chapter before he is allowed to proceed.

Considerable care has been taken to make the explanation of the various rules concise, yet clear. The attention of teachers is particularly called to the remarks on the absolute negative quantity, art. 11 and 12; in which an attempt has been made to relieve the pupil from a cause of embarrassment to which he is generally subjected when commencing his labours. The demonstration of the rule for *signs* in multiplication and division, has no claim to novelty. Notwithstanding its import-

ance, it is often omitted in elementary algebras. The omission of such demonstrations will at once be seen to be objectionable, when it is remembered that children are taught Algebra for the purpose of putting in their hands an instrument by which they may remove difficulties they meet with elsewhere. Such explanations should never be passed over without being understood; an opposite practice leads to loose habits of study, which often lay the foundation for much future difficulty, and deprive the pupil of the satisfaction which he would feel from the consciousness that every thing in the work he had studied had become his own.

The method employed, art. 17, in explaining the force of the index, was generally used by ancient authors it has been too much neglected in modern treatises. It will be found to give more precise notions respecting the exponent than can be obtained in any other way.

Throughout the first part, numerous examples have been given, sufficient, it is believed, to familiarize the student with all the methods of solution employed.

In the Second Part, the theory of equations has been much more fully developed than in any elementary treatise with which the author is acquainted. Care has been taken to preserve perfect rigour in the demonstrations. Some of these will be found to be very concise. The beautiful theorem of M. Sturm, for which he obtained the mathematical prize from the French Academy, has been developed at some length; as well as the compendious method of Horner for approximating to the values of the roots of an equation. The chapter on the Summation of Series has been principally taken from Young's Algebra; that on Binomial Equations from a treatise on the theory of equations, by the same author. For the

theory of Diophantine Analysis, the author is principally indebted to the admirable treatise on algebra by Euler.

In the preparation of the work, most of the treatises on the subject in common use have been consulted, more, however, for the purpose of discovering what had been done, than from an expectation of deriving much direct assistance from them. For the greater part of the theory, the author is only so far indebted to books as they have enabled him to store his own mind with knowledge on the subject. In selecting examples, however, he has made free use of all the treatises in his possession. A considerable number have been taken from "Bland's Algebraical Problems."

In conclusion, the author would remind those who may be disposed to use the work, that in a treatise of this kind much that is new could not be expected. Most that can be done is to simplify the arrangement, and render the demonstrations more clear and precise. If this result has been obtained, and an important branch of science has thus been made more accessible, one great point has been gained. With these remarks the author leaves the work to the judgment of an enlightened public.

Philadelphia, 5th month, 1846.

CONTENTS.

	Page
Synopsis of the Definitions	9
Definitions and Preliminary examples	11
Addition	18
Subtraction	22
Multiplication of Monomials	24
" " Polynomials	26
" by detached Coefficients	29
Division of Monomials	31
" " Polynomials	34
" by detached Coefficients	36
Synthetic Division	37
Table of Formulæ	39
Fractions	39
Proportion	50
Arithmetical Progression	56
Geometrical Progression	60
Harmonical Proportion and Progression	63
Permutation and Combination	66
Involution	70
Evolution	74
Extraction of the Square Root	77
" " Cube Root	79
General Rule for Extracting Roots of all Powers	82
Surds	85
Imaginary Quantities	93
Equations	98
Simple Equations containing one Unknown Quantity	99
" " containing two Unknown Quantities	104
" " containing three or more Unknown Quantities	111
Questions producing Simple Equations	120