
Algebra for Colleges and Schools

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ALGEBRA



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ALGEBRA
FOR COLLEGES AND SCHOOLS

BY

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REVISED AND ENLARGED
FOR THE USE OF AMERICAN SCHOOLS

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PREFACE.

WITHIN a comparatively short time, the algebra requirement for admission to many of our Colleges and Schools of Science has been much increased in both thoroughness of preparation and amount of subject-matter. This increase has made necessary the rearrangement and extension of elementary algebra, and it is for this reason that the present revision of Hall and Knight's *Elementary Algebra* has been undertaken.

The marked success of the work, and the hearty endorsement by many of our ablest educators of the treatment of the subject as therein presented, warrant the belief that the present edition, with its additional subject-matter, will be found a desirable arrangement and satisfactory treatment of every part of the subject required for admission to any of our Colleges or Schools of Technology.

Many changes in the original chapters have been made, among which we would call attention to the following: A proof, by mathematical induction, of the binomial theorem for positive integral index has been added to Chapter xxxix.; a method of finding a factor that will rationalize any binomial surd follows the treatment of binomial quadratic surds; Chapter xlii. has been re-written in part, and appears as a chapter on equations in quadratic form; and the chapter

on logarithms has been enlarged by the addition of a four-place table of logarithms with explanation of its use.

Chapters XXI, XXV, XXX, XXXIII, XXXVIII, XLII, XLIII, XLIV, XLV, XLVI, XLVII, and XLVIII. treat of portions of the subject that have not appeared in former editions. A chapter on General Theory of Equations is not usually found in an Elementary Algebra, but properly finds here a place in accordance with the purpose of the present revision; and its introduction makes the work available for use in college classes. Carefully selected exercises are given with each chapter, and at the end of the work a large miscellaneous collection will be found.

The *Higher Algebra* of Messrs. Hall and Knight has been drawn upon, and the works of Todhunter, Chrystal, and DeMorgan consulted in preparing the new chapters.

I gratefully acknowledge my indebtedness to Prof. J. Burkitt Webb of the Stevens Institute of Technology both for contributions of subject-matter, and valuable suggestions as to methods of treatment. My thanks are also due to Prof. W. H. Bristol, of the same institution, for suggestions as to the arrangement of the chapter on General Theory of Equations.

FRANK L. SEVENOAK.

JUNE, 1895.

PREFACE TO SECOND EDITION.

THE printing of the present edition from entirely new plates has enabled us to correct a few typographical errors found in the first edition, and give, at the suggestion of friends, a somewhat fuller explanation of the more difficult parts of the subject. We hope that the addition of new material to Chapters III., IV., V., X., XX., XXI., XLII., XLVIII., and of several sets of Miscellaneous Examples, will render the book still more acceptable to those whose commendation of the former edition has given us much pleasure.

JUNE, 1896.

PREFACE TO THIRD EDITION.

THE present edition contains additional material on Graphs. The subject has been treated in a single chapter (Chapter XLIX.) with the idea that the majority of teachers prefer such an arrangement.

Class-room experience has shown that Arts. 632-645 may be used with profit in connection with a first reading of Chapter XVII., and Arts. 646-649, 657-660 in connection with Chapter XXVI.

AUGUST, 1913.