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MATHEMATICAL SERIES:
JUNIOR HIGH SCHOOL
MATHEMATICS; BOOK II**

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**GEORGE WENTWORTH & DAVID
EUGENE SMITH & JOSEPH CLIFTON BROWN**

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MATHEMATICS

BOOK II

BY

GEORGE WENTWORTH

DAVID EUGENE SMITH

AND

JOSEPH CLIFTON BROWN



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PREFACE

A proper curriculum for junior high schools and six-year high schools demands, in the opinion of many teachers, a course in mathematics which presents concrete, intuitional geometry and the simple uses of algebra in the introductory stages. This book is intended to meet this demand for the second year of the introductory course.

Algebra furnishes the material for the first half of the book, the second half being devoted to those topics of business arithmetic which are appropriate to the student's maturity. The work in Book I has already shown the use of the formula in algebra and has furnished a large amount of material to which the formula can now properly be still further related. It is therefore natural to place algebra in the first half year and to make free use of it in the arithmetic that follows, unless the courses are carried along parallel to each other.

The work in algebra is such as every boy, and every girl as well, should become familiar with at this time. It represents that which each will meet in ordinary reading, and although it is not burdened with the technical phraseology of the shop it is utilitarian in the best sense. The formula is needed in reading books and articles of various kinds, the graph is used in many lines of business and study, the equation is helpful in manipulating the formula, and the negative number is so commonly used as to be part of the necessary equipment of every reader of current literature as well as of scientific books. These are, therefore, the features upon which the greatest emphasis is placed in the work of the first half year.

Any remodeling of the elementary curriculum that sacrificed thorough training in arithmetic would be a transitory thing,

and any anæmic course in mathematics that leaves the student too languid intellectually to pursue the subject further with success is foredoomed to failure. This book gives to arithmetic the place due to it because of its fundamental importance; it adheres to a sane and usable topical plan throughout the development of the various subjects treated; and because of this the authors believe that they have here produced a textbook suited to the needs of a rapidly growing class of schools and feel confident that they have not failed in any respect to adhere to the best standards of teaching.

In this book it will be seen that both the algebra and the arithmetic make use of the important facts presented in Book I, and that each includes those large and important topics which are valuable in the elementary education of every boy and girl. The two books thus work together to a common purpose, the first being more concrete and preparing by careful steps for the second, and the second blending with the first in presenting a well-organized foundation for the more formal mathematics which naturally follows. The two form such an introduction to mathematics as will enable a decision to be reached as to whether or not the student is fitted to continue with profit his work in this important intellectual field; they open the door to mathematics, showing its general nature and its purpose, and they thus present that preliminary and general view which it should be the privilege of every student to have and which it is the duty of every school to give at some time in the course. Such a general view of the purposes of mathematics is especially valuable for students whose work terminates at the close of this second year and who are thereby deprived of the advantages of a further high-school course.

Teachers are advised not to require all the exercises, to notice carefully the work on pages 239-244, and to select and vary the requirement from time to time.

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JUNIOR HIGH SCHOOL MATHEMATICS

BOOK II

PART I. ALGEBRA

I. THE FORMULA

Abbreviations and Symbols. In all your mathematics you have been using a kind of shorthand. You have used the symbol $+$ instead of writing the word "plus," the symbol \div for "divided by," and the symbol $\sqrt{\quad}$ for "the square root of." Moreover, instead of writing "the area of a rectangle is equal to the product of the base and height," you have learned to write simply

$$A = bh.$$

All this is a kind of shorthand and is designed to save time. We could get along without it, just as we could get along without the trolley car and the telephone, but we should lose time by so doing. Algebra saves time in learning and writing the necessary rules of number needed in the shop, the bank, the insurance office, and many other places.

We use many other symbols for numbers, as *doz.* (dozen) for 12, *cwt.* (hundredweight) for 100 lb., and *M* for 1000.

Students who have not studied Book I should be told how to evaluate an expression like bh when $b = 12$ and $h = 5$, and should be led to understand the meaning of the formula $A = bh$.