WENTWORTH SMITH MATHEMATICAL SERIES. JUNIOR HIGH SCHOOL MATHEMATICS: BOOK III

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649620753

Wentworth Smith Mathematical Series. Junior High School Mathematics: Book III by George Wentworth & David E. Smith & Joseph C. Brown

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

GEORGE WENTWORTH & DAVID E. SMITH & JOSEPH C. BROWN

WENTWORTH SMITH MATHEMATICAL SERIES. JUNIOR HIGH SCHOOL MATHEMATICS: BOOK III

Trieste

WENTWORTH-SMITH MATHEMATICAL SERIES

JUNIOR HIGH SCHOOL MATHEMATICS

BOOK III

BY

GEORGE WENTWORTH

DAVID EUGENE SMITH

AND

JOSEPH CLIFTON BROWN

GINN AND COMPANY

BOSTON · NEW YORK · CHICAGO · LONDON
ATLANTA · DALLAS · COLUMBUS · SAN FRANCISCO

4189

The Athenæum Press
GINN AND COMPANY · PROPRIETORS · BOSTON · U.S.A.

PREFACE

While this book presents a thoroughly practical kind of mathematics, as do also Books I and II, it is the purpose of the book to make the treatment sufficiently formal to enable the student to appreciate more fully the nature of pure mathematics. It is only by so doing that the door of the science can be opened sufficiently to enable him to determine whether he should pursue the subject further. In Book I the work in arithmetic was extended, the subject of intuitive geometry was introduced, and the algebraic formula was used when needed; in Book II the work in arithmetic was continued, particularly as it refers to the problems of everyday life, and such algebra as is essential in various practical lines was set forth; and now Book III offers a fitting close to an introductory course in mathematics by extending the work in practical algebra, by showing the nature and some of the practical uses of trigonometry, and by introducing the student to the first steps of demonstrative geometry.

The student who expects to enter college will find that the algebra given in this series satisfies the requirements in many cases and that even the highest requirements in both algebra and geometry can be met in a year or a year and a half more. The authors have had in mind the needs not only of this class of students but also of those students who do not expect to enter college and yet who wish for and are entitled to have a general survey of elementary algebra, an introduction to the meaning and the practical uses of trigonometry, and an idea of scientific demonstration as it appears in its most available form, the elements of geometry.

As to sequence, algebra has the first place in this book for the reason that the student is already familiar with the subject and needs to use it in the trigonometry. Trigonometry is next studied for the reason that it requires algebra but in its first stages, which are here presented, makes no use of demonstrative geometry, depending rather upon the intuitive geometry already studied. Demonstrative geometry comes last for the reason that it requires more maturity of judgment than the kind of algebra and trigonometry given in this book. It is feasible, however, to carry the algebra and geometry parallel if desired, or to reverse the order.

Special attention is called to the sequence of the work in the first steps in demonstrative geometry, independent deduction preceding the formal proof and a large number of practical exercises following each proposition. The exercises are simple in their nature, as they should be at this early stage, but they are sufficient to encourage that independence of mind which is far more valuable than a knowledge of a conventional number of formal propositions. In the treatment of the basal propositions themselves an attempt has been made to depart from that extreme formality that is often discouraging to students at this stage of their development.

The authors wish to express their indebtedness to Mr. T. M. Cleland for his artistic treatment of the full-page illustrations. They feel that these illustrations have not merely an esthetic value but an important educational value as well, showing as they do the geometric figures in immediate relation to their practical applications.

CONTENTS

PART I. ALGEBRA

PART II. TRIGONOMETRY

PART III. DEMONSTRATIVE GEOMETRY

SYMBOLS AND ABBREVIATIONS

The following are the most important symbols used:

$+$	plus	$\parallel$	parallel
$-$	minus	$\perp$	perpendicular
$\times$ or $\cdot$	times	$\angle$	angle
$+, /$, or :	divided by	$\triangle$	triangle
$\sqrt{\ }$	square root of	$\square$	rectangle
$\sqrt[n]{\ }$	nth root of	$\square$	parallelogram
$=$	is equal to, equals, is equivalent to	st.	straight
		rt.	right
a^2	square of a	Ax.	axiom
a^n	nth power of a	Post.	postulate
$\cdots$	and so on	Ex.	exercise, example
$>$	is greater than	Const.	construction
$<$	is less than	Def.	definition
$\therefore$	therefore	Cor.	corollary

Symbols of aggregation are used as explained in the text.

There is no generally accepted symbol for "is congruent to." The sign $=$ is commonly employed, the context telling whether equality, equivalence, identity, or congruence is to be understood; but some teachers use $\cong$, $\cong$, or $\equiv$ for congruence.

SUGGESTIONS AS TO OMISSIONS

Students who have completed Books I and II may briefly review pages 1–34 and begin their advanced work on page 35 In geometry they may briefly review pages 135–164 and begin with demonstrative geometry on page 165. The more difficult propositions in the exercises in geometry are placed towards the end of each exercise and may be assigned to specially qualified students. Pages 95–106 and 257–270 may be omitted if desired.

JUNIOR HIGH SCHOOL MATHEMATICS

BOOK III

PART I. ALGEBRA

I. INTRODUCTION

1. Nature of the Work. Students who have completed Books I and II have learned the nature of algebra. They have learned its importance in the understanding of formulas, graphs, and equations; the use of the negative number; and the applications of the science to measurements of various kinds and to the solution of the problems of arithmetic. They are therefore prepared to undertake the study of a more advanced kind of algebra.

Just as those who know short methods in arithmetic can frequently obtain a result in less time than those who do not know them, so those who know even the first part of algebra can often save much time in the solution of problems in arithmetic. Those who study more algebra will be still better prepared. Such students will better understand the formulas which they will meet in books and periodicals relating to mechanical work, domestic art, construction, aviation, and similar subjects. They will also be the better able to develop for themselves such formulas when they need them.