

**FIRST-YEAR  
MATHEMATICS FOR  
SECONDARY SCHOOLS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649584369

First-year mathematics for secondary schools by Various

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](http://www.triestepublishing.com)

**VARIOUS**

**FIRST-YEAR  
MATHEMATICS FOR  
SECONDARY SCHOOLS**



# First-Year Mathematics

## For Secondary Schools

By

GEORGE WILLIAM MYERS

*Professor of the Teaching of Mathematics and Astronomy, College of  
Education of the University of Chicago*

and

WILLIAM R. WICKES      HARRIS F. MacNEISH  
ERNST R. BRESLICH      ERNEST A. WREIDT

*Instructors in Mathematics in the University High School  
of the University of Chicago*

17063

SCHOOL OF EDUCATION MANUALS  
SECONDARY TEXTS

CHICAGO  
THE UNIVERSITY OF CHICAGO PRESS  
1907

FEB 1908

COPYRIGHT 1906 BY  
GEORGE W. MYERS

First edition privately printed October, 1906  
Second impression published April 1907

Composed and Printed By  
The University of Chicago Press  
Chicago, Illinois, U. S. A.

GA 39  
- 1198 f

## TABLE OF CONTENTS

	PAGE
Preface . . . . .	xi
<b>CHAPTER I</b>	
NUMBER GENERALIZED	
§ 1. Uses of Positive and Negative Number . . . . .	1
<b>CHAPTER II</b>	
THE OPERATIONS APPLIED TO POSITIVE NUMBERS	
§ 2. Indicating Arithmetical Operations Algebraically . . . . .	6
<b>CHAPTER III</b>	
THE ARITHMETICAL OPERATIONS WITH NUMBERS REPRESENTED BY LINES	
§ 3. Operations with Lines . . . . .	11
§ 4. Sums and Differences of Angles . . . . .	13
§ 5. Products as Rectangles . . . . .	13
<b>CHAPTER IV</b>	
ADDITION, SUBTRACTION, AND MULTIPLICATION OF POSITIVE AND NEGATIVE WHOLE NUMBERS	
§ 6. Adding Positive and Negative Whole Numbers . . . . .	15
§ 7. Subtracting Positive and Negative Whole Numbers . . . . .	17
§ 8. Multiplication of Positive and Negative Whole Numbers . . . . .	18
§ 9. Law of Signs for Multiplication . . . . .	23
<b>CHAPTER V</b>	
OPERATIONS ON FRACTIONAL NUMBERS GENERALIZED	
§ 10. Unit-Fractions—Review Problems . . . . .	24
§ 11. Fractions Having the Same Numerators . . . . .	25
§ 12. Addition and Subtraction of Fractions in General . . . . .	25
§ 13. Multiplication and Division of Fractions in General . . . . .	26

<b>CHAPTER VI</b>	
USES OF THE EQUATION	
§14. Problems . . . . .	PAGE 29
§15. The Sum of the Three Angles of Any Triangle . . . . .	31
§16. Angles Made by Two Intersecting Straight Lines . . . . .	32
§17. The Sum of the Angles of Polygons . . . . .	32
§18. The Exterior Angles of Regular Polygons . . . . .	33
<b>CHAPTER VII</b>	
USES OF INEQUALITIES	
§19. Laws for Use of Expressions of Inequality . . . . .	35
§20. Problems with Inequalities . . . . .	35
<b>CHAPTER VIII</b>	
THE OPERATIONS OF ARITHMETIC ABBREVIATION	
§21. General Arithmetic . . . . .	37
§22. Laws of Percentage and Interest . . . . .	39
<b>CHAPTER IX</b>	
THE EVALUATION OF EXPRESSIONS	
§23. The Circle and Sphere . . . . .	40
§24. Motion and Mensuration . . . . .	41
<b>CHAPTER X</b>	
GEOMETRIC REPRESENTATION OF QUANTITY	
§25. Drawing to Scale . . . . .	44
§26. Summary . . . . .	49
§27. Exceptional Cases . . . . .	49
§28. Triangles Having the Same Shape (Similar Triangles) . . . . .	50
<b>CHAPTER XI</b>	
EQUATION APPLIED TO SIMPLE PROBLEMS ON BEAMS	
§29. Common Uses of Forces . . . . .	55
§30. Experiments . . . . .	56
§31. First Law of Parallel Forces . . . . .	59
§32. Practical Problems . . . . .	59



	PAGE
§33. Turning-Tendencies (Leverages) . . . . .	61
§34. Second Law of Parallel Forces . . . . .	66
§35. Practical Problems . . . . .	66
§36. Solution by One Unknown Number . . . . .	74
§37. Solution by Two Unknown Numbers . . . . .	75

CHAPTER XII

THE SIMPLE EQUATION

§38. The Axioms . . . . .	78
§39. Solution of Equations by Axioms . . . . .	81

CHAPTER XIII

THE GRAPH

§40. Locating Points by Means of Numbers . . . . .	83
§41. Picturing or Plotting Laws Connecting Numbers . . . . .	85

CHAPTER XIV

EQUATIONS CONTAINING FRACTIONS

§42. Freeing an Equation of Denominators . . . . .	88
§43. Problems in Equations Involving Fractions . . . . .	89
§44. Problems Leading to Equations Containing Fractional and Literal Numbers . . . . .	91

CHAPTER XV

THE FUNDAMENTAL PROCESSES APPLIED TO INTEGRAL  
ALGEBRAIC EXPRESSIONS

§45. Addition of Integral Algebraic Expressions . . . . .	97
§46. Subtraction of Integral Algebraic Expressions . . . . .	99
§47. Multiplication of Integral Algebraic Expressions . . . . .	101
§48. Geometrical Representation of Special Forms of Products	106
§49. Division of Integral Algebraic Expressions . . . . .	108
§50. Cases in which $m = n$ , and $m < n$ . . . . .	110
§51. Exercises . . . . .	111
§52. Division of a Polynomial by a Monomial . . . . .	111
§53. Division of a Polynomial by a Polynomial . . . . .	112

## CHAPTER XVI

## FRACTIONS

	PAGE
§54. Fractions Having the Same Denominator . . . . .	114
§55. Fractions Having Different Denominators . . . . .	115
§56. Multiplication of Fractions . . . . .	117
§57. Division of Fractions . . . . .	119

## CHAPTER XVII

## EQUATIONS INVOLVING FRACTIONAL FORMS

§58. A Monomial Factor . . . . .	122
§59. A Binomial Factor . . . . .	123
§60. Uses of Factoring in Solving Equations . . . . .	128

## CHAPTER XVIII

## FRACTIONS INVOLVING FACTORABLE FORMS

§61. Factoring in Reducing Fractions to Lowest Terms . . . . .	131
§62. Factoring in Adding and Subtracting Fractions . . . . .	131
§63. Factoring in Multiplying Fractions . . . . .	132

## CHAPTER XIX

## FACTORING

§64. Monomial Factors . . . . .	133
§65. The Perfect Square . . . . .	136
§66. The Difference of Two Squares . . . . .	138
§67. The Trinomial of the Form $x^2+ax+b$ . . . . .	140
§68. The Trinomial of the Form $ax^2+bx+c$ . . . . .	142
§69. The Sum or Difference of Two Cubes . . . . .	145
§70. The Factor Theorem . . . . .	146

## CHAPTER XX

## RATIO, PROPORTION, AND SIMILARITY

§71. Examples and Definition . . . . .	149
§72. Exercises and Problems . . . . .	149
§73. Similar Figures and Proportionality . . . . .	153
§74. Problems and Applications . . . . .	155

CHAPTER XXI

LINEAR EQUATIONS CONTAINING TWO UNKNOWN NUMBERS

	PAGE
§75. Plotting Linear Equations . . . . .	158
§76. Graphical Solution of Simultaneous Equations of the First Degree . . . . .	159
§77. Equivalent Equations . . . . .	159
§78. Inconsistent Equations . . . . .	160
§79. Elimination . . . . .	160

CHAPTER XXII

QUADRATIC EQUATIONS

§80. Uses of Quadratics and Interpretation of Negative Roots . . . . .	164
§81. Formal Problems . . . . .	165
§82. Problems Leading to Quadratics . . . . .	166

CHAPTER XXIII

LOGARITHMS

§83. Logarithms of Exact Powers of 10 . . . . .	168
§84. Logarithms of Numbers that are not Exact Powers of 10 . . . . .	170
§85. Meaning and Use of a Four-Place Table of Logarithms . . . . .	174
§86. To Find from a Table the Logarithm of a given Number . . . . .	174
§87. To Find from a Table the Number that Corresponds to a Given Logarithm . . . . .	175
§88. Questions and Problems . . . . .	176
§89. Problems for Solution by the Aid of Logarithmic Tables . . . . .	179