AN ELEMENTARY GEOMETRY AND TRIGONOMETRY

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An Elementary Geometry and Trigonometry by William F. Bradbury

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WILLIAM F. BRADBURY

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AN

ELEMENTARY

GEOMETRY

AND

TRIGONOMETRY.

BY

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PREFACE.

A LARGE number of the Theorems usually presented in text-books of Geometry are unimportant in themselves and in no way connected with the subsequent Propositions. By spending too much time on things of little importance, the pupil is frequently unable to advance to those of the highest practical value. In this work, although no important Theorem has been omitted, not one has been introduced that is not necessary to the demonstration of the last Theorem of the five Books, namely, that in relation to the volume of a sphere. Thus the whole constitutes a single Theorem, without an unnecessary link in the chain of reasoning.

These five Books, including Ratio and Proportion, are presented in eighty-one Propositions, covering only seventy pages. This brevity has been attained by omitting all unconnected propositions, and adopting those definitions and demonstrations that lead by the shortest path to the desired end. At the close of each Book are Practical Questions, serving partly as a review, partly as practical applications of the principles of the Book, and partly as suggestions to the teacher. As those who have not had experience in discovering methods of demonstration have but little real acquaintance with Geometry, there have been added to each Book, for those who have the time and the ability, Theorems for original demonstration. These Exercises, with different methods of proving propositions already demon-

strated, include those that are usually inserted, but whose demonstration in this work has been omitted. In some of these Exercises references are given to the necessary propositions; in some suggestions are made; and in a few cases the figure is constructed as the proof will require.

A sixth Book of Problems of Construction is added, which is followed by Problems for the pupil to solve. This Book, or any part of it, if thought best, can be taken immediately after completing Book III.

The Trigonometry is accompanied by the necessary Tables and their explanation, and presents in only fifty-two pages all the essential principles of Plane Trigonometry given by both the Geometrical and Analytical methods, and so arranged that either can be studied independently of the other. In fourteen more pages is given the application of these principles to the measurement of heights and distances and the determination of areas.

W. F. B.

CAMBRIDGE, MASS., April, 1872.

CONTENTS.

GEOMETRY.

PAGE

INTRODUCTORY DEFINITIONS 1

BOOK I.

ANGLES, LINES, POLYGONS 3
Exercises 22

RATIO AND PROPORTION 25

BOOK II.

RELATIONS OF POLYGONS 31
Exercises 45

BOOK III.

THE CIRCLE 49
Exercises 61

BOOK IV.

GEOMETRY OF SPACE.
Planes and their Angles 64
Exercises 68

BOOK V.

POLYEDRONS.
Prisms, Cylinders 69
Pyramids, Cones 75
The Sphere 82
Exercises 86

BOOK VI.

PROBLEMS OF CONSTRUCTION 89
Exercises 106

PLANE TRIGONOMETRY.

CHAPTER I.

LOGARITHMS.
Nature of Logarithms 1
Explanation of Table of Logarithms 3
Multiplication and Division by Logarithms 7, 8
Involution and Evolution by Logarithms 8, 9

CHAPTER II.

TRIGONOMETRIC FUNCTIONS. GEOMETRICAL METHOD.
Definitions of Sine, Tangent, &c. 11
Values of certain Sines, Tangents, &c. 13
Algebraic Signs of the Sines, Tangents, &c. 14
Explanation of Table of Sines, Tangents, &c. 14

CHAPTER III.

SOLUTION OF PLANE TRIANGLES. GEOMETRICAL METHOD.
Right-Angled Triangles 17
Oblique-Angled Triangles 22

CHAPTER IV.

TRIGONOMETRIC FUNCTIONS. ANALYTICAL METHOD.
Definitions of Sine, Tangent, &c. 29
Values of Sines, Tangents, &c. 32
Algebraic Signs of the Sines, Tangents, &c. 38

CHAPTER V.

SOLUTION OF PLANE TRIANGLES. ANALYTICAL METHOD.
Right-Angled Triangles 41
Oblique-Angled Triangles 46

CHAPTER VI.

PRACTICAL APPLICATIONS.
Heights and Distances 53
Determination of Areas 60
Miscellaneous Examples 64

PLANE GEOMETRY.

INTRODUCTORY DEFINITIONS.

1. Mathematics is the science of quantity.

2. Quantity is that which can be measured; as distance, time, weight.

3. Geometry is that branch of mathematics which treats of the properties of extension.

4. Extension has one or more of the three dimensions, length, breadth, or thickness.

5. A **Point** has position, but not magnitude.

6. A **Line** has length, without breadth or thickness.

7 A **Straight Line** is one whose direction is the same throughout; as *A B*.

A straight line has two directions exactly opposite, of which either may be assumed as its direction.

The word *line*, used alone in this book, means a straight line.

8. *Corollary.* Two points of a line determine its position.

9. A **Curved Line** is one whose direction is constantly changing; as *C D*.

10. A **Surface** has length and breadth, but no thickness.