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MATHEMATICAL SERIES. AN
ELEMENTARY GEOMETRY: PLANE,
SOLID, AND SPHERICAL: WITH
NUMEROUS EXERCISES ILLUSTRATIVE
OF EACH BOOK**

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WILLIAM F. BRADBURY

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AN

ELEMENTARY
G E O M E T R Y

PLANE, SOLID, AND SPHERICAL

WITH NUMEROUS EXERCISES ILLUSTRATIVE OF THE
PRINCIPLES OF EACH BOOK.

University Edition.

BY

WILLIAM F. BRADBURY, A.M.,

HOPKINS MASTER IN THE CAMBRIDGE HIGH SCHOOL; AUTHOR OF AN ELEMENTARY ALGEBRA,
AN ELEMENTARY GEOMETRY AND TRIGONOMETRY, AND A TREATISE
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PREFACE.

THE favor with which the author's smaller work on Elementary Geometry has been received has induced him to undertake the present more complete work, in the hope that it may prove equally useful to the higher classes of learners for whom it is intended.

While each Book has been made fuller, the same plan has, for the most part, been followed as in the former work: as in that, numerous practical questions illustrative of each Book, and theorems for original demonstration are introduced, serving as practical applications of the principles of the Book, and for discipline in discovering methods of demonstration. In addition to the exercises at the end of each Book many more, arranged in proper order, have been added at the close of the whole. These features are believed to be of special value in securing a real acquaintance with Geometry and its practical application.

In the discussion on the area of the rectangle and the circle, and the volume of the rectangular parallelepiped and the sphere, a method different from that in the smaller work has been adopted as better for the class of learners for whom this work is designed. The *direct* method of proof has been used in propositions usually proved by the indirect (see 85, last part of 87, and 102, in Book I.).

In the preparation of this work the author has obtained valuable suggestions from many European works on Elementary Geometry, and especially from the French works of Montferrier and of Rouché and Comberousse.

Of the points in which the author claims special originality, attention is called to Propositions XVIII. (including its Corollaries) and XX. of Book I. ; the definition and consequent discussion of Similar Polygons (II. 52-58, 76-78); the use made of Proposition X., of Book III., in subsequent demonstrations; and the definition and consequent discussion of Similar Solids (VII. 78-82).

For the introduction of the terms "Normal to a Plane," and "Aspect of a Plane," the author is indebted to JAMES MILLS PEIRCE, Professor of Mathematics in Harvard University. By the use of these terms the author is enabled to extend to planes the same idea as is used in the definition and treatment of lines and of angles in Book I. For a discussion of the word "Aspect," as applied to planes, those interested are referred to several articles in the London journal, "Nature," for the years 1871-72, and specially to an article, by Professor J. M. PEIRCE, on p. 102, Vol. V., of the same journal.

W. F. B.

CAMBRIDGE, MASS., April, 1877.

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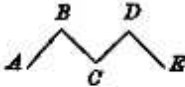

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ELEMENTARY GEOMETRY.

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 AB .


A straight line has two directions exactly opposite, of which either may be assumed as its direction.
8. A **Broken Line** is a continuous line formed of different straight lines ; as $ABCDE$.

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

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