ROBINSON'S MATHEMATICAL SERIES. ELEMENTS OF GEOMETRY, PLANE AND SPHERICAL: WITH NUMEROUS PRACTICAL PROBLEMS

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649571666

Robinson's Mathematical Series. Elements of Geometry, Plane and Spherical: With Numerous Practical Problems by Horatio N. Robinson & I. F. Quinby

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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HORATIO N. ROBINSON & I. F. QUINBY

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Trieste

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ELEMENTS

OF

GEOMETRY,

PLANE AND SPHERICAL;

WITH

NUMEROUS PRACTICAL PROBLEMS.

BY

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NEW YORK:
IVISON, PHINNEY, BLAKEMAN & CO.,
CHICAGO: S. C. GRIGGS & CO.

1869.

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PREFACE.

In the preparation of this work, the author's previous treatise, Elements of Geometry, has formed the groundwork of construction. But in adapting the work to the present advanced state of Mathematical education in our best Institutions, it was found necessary so to alter the plan, and the arrangement of subjects, as to make this essentially a new work. The demonstrations of propositions have undergone radical changes, many new propositions have been introduced, and the number of Practical Problems greatly increased, so that the work is now believed to be as full and complete as could be desired in an elementary treatise.

In view of the fact that the Seventh Book is so much larger than the others, it may be asked why it is not divided into two. We answer, that classifications and divisions are based upon differences, and that the differences seized upon for this purpose must be determined by the nature of the properties and relations we wish to investigate. There is such a close resemblance between the geometrical properties of the polyedrons and the round bodies, and the demonstrations relating to the former require such slight modifications to become applicable to the latter, that there seems no sufficient reason for separating into two Books that part of Geometry which treats of them.

Practical rules with applications will be found throughout the work, and in addition to these, there is a full collection of carefully selected Practical Problems. These are given to exercise the powers and test the proficiency of the pupil, and when he has mastered the most or all of them, it is not likely that he will rest satisfied with present acquisition, but, conscious of augmented strength and certain of reward, he will enter new fields of investigation.

The author has been aided, in the preparation of the present work, by I. F. Quinby, A.M., of the University of Rochester, N. Y., late Professor of Mathematics in the United States Military Academy at West Point. The thorough scholarship and long and successful experience of this gentleman in the class-room, eminently qualify him for such a task; and to him the public are indebted for much that is valuable, both in the matter and arrangement of this treatise.

October, 1860.

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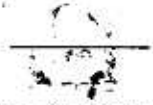

PLANE GEOMETRY.

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GEOMETRY.

DEFINITIONS.

1. Geometry is the science which treats of position, and of the forms, measurements, mutual relations, and properties of limited portions of *space*.

SPACE extends without limit in all directions, and contains all bodies.

2. A **Point** is mere position, and has no magnitude.

3. Extension is a term employed to denote that property of bodies by virtue of which they occupy definite portions of space. The dimensions of extension are *length*, *breadth*, and *thickness*.

4. A **Line** is that which has extension in length only. The extremities of a line are points.

5. A **Right** or **Straight Line** is one all of whose parts lie in the same direction.

6. A **Curved Line** is one whose consecutive parts, however small, do not lie in the same direction.

7. A **Broken** or **Crooked Line** is composed of several straight lines, joined one to another successively, and extending in different directions.

When the word *line* is used, a straight line is to be understood, unless otherwise expressed.

8. A **Surface** or **Superficies** is that which has extension in length and breadth only.

9. A **Plane Surface**, or a **Plane**, is a surface such that