MARKS' FIRST LESSONS IN GEOMETRY: OBJECTIVELY PRESENTED, AND DESIGNED FOR THE USE PRIMSSES IN GRAMMAR SCHOOLS, ACADEMIES, ETC

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649643684

Marks' First Lessons in Geometry: Objectively Presented, and Designed for the Use Primsses in Grammar Schools, Academies, Etc by Bernhard Marks

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Cover @ 2017

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BERNHARD MARKS

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AND DESIGNED FOR

THE USE OF PRIMARY CLASSES IN GRAMMAR SCHOOLS, ACADEMIES, ETC.

BY

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NEW YORK:
PUBLISHED BY IVISON, PHINNEY, BLAKEMAN, & CO.
PHILADELPHIA: J. B. LIPPINCOTT & CO.
CHICAGO: S. C. GRIGGS & CO.
1869.

Entered, according to Act of Congress, in the year 1868, by
BERNHARD MARKS,
In the Clerk's Office of the District Court of the United States for the District of California.

167802

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Geo. C. Rand & Avery, Electrotypers and Printers,
3 Cornhill, Boston.

PREFACE.

How it ever came to pass that Arithmetic should be taught to the extent attained in the grammar schools of the civilized world, while Geometry is almost wholly excluded from them, is a problem for which the author of this little book has often sought a solution, but in vain.

Thousands of boys are allowed to leave school at the age of fourteen or sixteen years, and are sent into the carpenter-shop, the machine-shop, the mill-wright's, or the surveyor's office, stuffed to repletion with Interest and Discount, but so utterly ignorant of the merest elements of Geometry, that they could not find the centre of a circle already described, if their lives depended upon it.

The reason of this may be truly stated thus: Arithmetic, being considered an elementary branch, is included in all systems of elementary instruction; but Geometry, being regarded as a higher branch, is reserved for systems of advanced education, and is, on that account, reached by but very few of the many who need it.

The error here is fundamental. Instead of teaching the *elements of all branches*, *we teach elementary branches* much too exhaustively.

The elements of Geometry are much easier to learn, and are of more value when learned, than advanced Arithmetic;

and, if a boy is to leave school with merely a grammar-school education, he would be better prepared for the active duties of life with a *little* Arithmetic and *some* Geometry, than with *more* Arithmetic and *no* Geometry.

Unthinking persons frequently assert that young children are incapable of reasoning, and that the truths of Geometry are too abstract in their nature to be apprehended by them.

To these objections, it may be answered, that any ordinary child, five years of age, can deduce the conclusion of a syllogism if it understands the terms contained in the propositions; and that nothing can be more palpable to the mind of a child than forms, magnitudes, and directions.

There are many teachers who imagine that the perceptive faculties of children should be cultivated *exclusively* in early youth, and that the reason should be addressed only at a later period.

It is certainly true that perception should receive a larger share of attention than the other faculties during the first school years; but it is equally certain that *no* faculty can be safely disregarded, even for a time. The root does not attain maturity before the stem appears; neither does the stem attain its growth before its branches come forth to give birth in turn to leaves; but root, stem, and leaves are found simultaneously in the youngest plant.

That the reason may be profitably addressed through the medium of Geometry at as early an age as seven years is asserted by no less an authority than President Hill of Harvard College, who says, in the preface to his admirable little Geometry, that a child seven years old may be taught Geometry more easily than one of fifteen.

The author holds that this science should be taught in all primary and grammar schools, for the same reasons that apply to all other branches. One of these reasons will be stated here, because it is not sufficiently recognized even by teachers. It is this: —

The prime object of school instruction is to place in the hands of the pupil the means of continuing his studies without aid after he leaves school. The man who is not a student of some part of God's works cannot be said to live a rational life. It is the proper business of the school to do for each branch of science exactly what is done for reading.

Children are taught to read, not for the sake of what is contained in their readers, but that they may be able to read all through life, and thereby fulfil one of the requirements of civilized society. So, enough of each branch of science should be taught to enable the pupil to pursue it after leaving school.

If this view is correct, it is wrong to allow a pupil to reach the age of fourteen years without knowing even the alphabet of Geometry. He should be taught at least how to *read* it.

It certainly does seem probable, that if the youth who now leave school with so much Arithmetic, and no Geometry, were taught the first rudiments of the science, thousands of them would be led to the study of the higher mathematics in their mature years, by reason of those attractions of Geometry which Arithmetic does not possess.

TO THE PROFESSIONAL READER.

THIS little book is constructed for the purpose of instructing large classes, and with reference to being used also by teachers who have themselves no knowledge of Geometry.

The first statement will account for the many, and perhaps seemingly needless, repetitions; and the second, for the *suggestive* style of some of the questions in the lessons which *develop* the matter contained in the review-lessons.

Attention is respectfully directed to the following points: —

First the particular, then the general. See page 25.

Why is *m n g* an acute angle?

What is an acute angle?

Here the attention is directed first to this particular angle; then this is taken as an example of its kind, and the idea generalized by describing the class. See also page 29.

Why are the lines *ef* and *gh* said to be parallel?

When are lines said to be parallel?

Many of the questions are intended to test the vividness of the pupil's conception. See page 29.

Also page 78. If the circumference were divided into 360 equal parts, would each arc be large or small?

Many of the questions are intended to test the attention of the pupil.

The thing is not to be recognized by the definition; but the definition is to be a description of the thing, a description of the conception brought to the mind of the pupil by means of the name.

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