

**ELEMENTARY TREATISE ON PLANE
TRIGONOMETRY WITH A NUMEROUS
COLLECTION OF CRAMPLES,
CHIEFLY DESIGNED FOR THE USE OF
SCHOOLS AND BEGINNERS**

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Elementary treatise on plane trigonometry with a numerous collection of cramples, chiefly designed for the use of schools and beginners by R. D. Beasley

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R. D. BEASLEY

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AN ELEMENTARY TREATISE
ON
PLANE TRIGONOMETRY;

WITH

A Numerous Collection of Examples,

CHIEFLY DESIGNED FOR THE USE OF SCHOOLS AND BEGINNERS.

BY

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PREFACE.

THE following pages are specially intended for use in Schools. In the choice of matter I have been chiefly guided by the requirements of the three days' Examination at Cambridge, with the exception of proportional parts in logarithms which I have omitted. In one point, I have ventured to deviate from the usual custom. I have denoted angles throughout by the Greek characters, even before the explanation of circular measure. My reasons for doing so were chiefly two; first, that they are much more distinctly and easily written, and it is advisable that a boy should be accustomed in the text to the notation he uses on his paper; secondly, I am thus enabled to insert the algebraical symbols for the angles in the figures, a very great advantage in such propositions as that proved in Art. 27. I have added about 400 Examples mainly collected from the Examination Papers of the last ten years, and I have taken great pains to exclude from the body of the work any which might dishearten a beginner by their difficulty.

In conclusion, I must express my great obligations to my friend the Rev. R. B. Mayor, of Rugby. Without his kind encouragement I should not have ventured to have offered these pages to the public; and I am indebted to him, not only for many valuable suggestions, but for a careful revision of the whole work.

R. D. BEASLEY.

ST JOHN'S COLLEGE, CAMBRIDGE,
September, 1858.

ADVERTISEMENT TO THE SECOND EDITION.

THE chief alterations in this Edition are the addition of Articles 63, bis, and 73—75, and of the easy series of Examples marked A.

GRAMMAR SCHOOL, GRANTHAM, *January, 1865.*

ADVERTISEMENT TO THE THIRD EDITION.

In this Edition the Examples have been largely increased, Articles 76—78 have been added, and the series of Examination Papers.

GRAMMAR SCHOOL, GRANTHAM, *February, 1872.*

ADVERTISEMENT TO THE EIGHTH EDITION.

In this Edition Section IX, on proportional parts has been added, and the number of Examination Papers considerably increased.

BOURNEMOUTH, *March, 1883.*

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PLANE TRIGONOMETRY.

SECTION I.

UNITS OF MEASUREMENT. USE OF SIGNS + AND -. MEANING OF THE TERM "ANGLE" IN TRIGONOMETRY. THE TRIGONOMETRICAL RATIOS. PRACTICAL APPLICATION. INSTRUMENTS FOR SURVEYING.

1. *Object of Trigonometry.* In Trigonometry we apply Algebraical symbols to establish certain relations between the magnitudes of the sides and angles of plane rectilineal figures. These relations are useful for all the higher branches of Mathematics, and are specially applicable to surveying, and to determining the heights and distances of inaccessible objects. In the present treatise we shall confine ourselves to the simpler relations, and some practical applications of them.

We must first consider the mode of estimating algebraically the magnitudes of lines, areas, and angles.

2. *Measurement of lines.* As lines have neither breadth nor thickness we have only to measure their length. To do this we take some standard length, as one foot, one inch, five inches, or any other definite length as our unit of measurement; and the length of any line is then measured and represented by the number, whether whole or fractional, of these units which it contains. Thus if 5 inches is our unit, a line of 20 inches is measured by the number 4, and is called the line 4, that is, the line whose length is 4 times the unit of length. So also the line a would be the line whose length is a times the unit of length.

In investigations involving only algebraical symbols it is indifferent what unit is employed: but we must be careful to remember that throughout the same investigation we are using the same unit.