A SHORT ACCOUNT

OF THE

HISTORY OF MATHEMATICS

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Preface

The subject-matter of this book is a historical summary of the development of mathematics, illustrated by the lives and discoveries of those to whome the progress of the science is mainly due. It may serve as an introduction to more elaborate works on the subject, but primarily it is intended to give a short and popular account of those leading facts in the history of mathematics which many who are unwilling, or have not the time, to study it systematically may yet desire to know.

The first edition was substantially a transcript of some lectures which I delievered in the year 1888 with the object of giving a sketch of the history, previous to the nineteenth century, that should be intelligible to any one acquainted with the elements of mathematics. In the second edition, issued in 1893, I rearranged parts of it, and introduced a good deal of additional matter.

The scheme of arrangement will be gathered from the table of contents at the end of this preface. Shortly it is as follows. The first chapter contains a brief statement of what is known concerning the mathematics of the Egyptians and Phoenicians; that is introductory to the history of mathematics under Greek influence. The subsequent history is divided into three periods: first, that under Greek influence, chapters II to VII; second, that of the middle ages and renaissance, chapters VIII to XIII; and lastly that of modern times, chapters XIV to XIX.

In discussing the mathematics of these periods I have confined myself to giving the leading events in the history, and frequently have passed in silence over men or works whose influence was comparatively unimportant. Doubtless an exaggerated view of the discoveries of those mathematicians who are mentioned may be caused by the non-allusion to minor writers who preceded and prepared the way for them, but in all historical sketches this is to some extent

inevitable, and I have done my best to guard against it by interpolating remarks on the progress of the science at different times. Perhaps also I should here state that generally I have not referred to the results obtained by practical astronomers and physicists unless there was some mathematical interest in them. In quoting results I have commonly made use of modern notation; the reader must therefore recollect that, while the matter is the same as that of any writer to whom allusion is made, his proof is sometimes translated into a more convenient and familiar language.

The greater part of my account is a compilation from existing histories or memoirs, as indeed must be necessarily the case where the works discussed are so numerous and cover so much ground. When authorities disagree I have generally stated only that biew which seems to me to be the most probable; but if the question be one of importance, I believe that I habe always indicated that there is a difference of opinion about it.

I think that it is undesirable to overload a popular account with a mass of detailed references or the authority for every particular fact mentioned. For the history previous to 1758, I need only refer, once for all, to the closely printed pages of M. Cantor's monumental *Vorlesungen über die Geschichte der Mathematik* (hereafter alluded to as Cantor), which may be regarded as the standard treatise on the subject, but usually I have given references to the other leading authorities on which I have relied or with which I am acquainted. My account for the period subsequent to 1758 is generally based on the memoirs or monographs referred to in the footnotes, but the main facts to 1799 have been also enumerated in a supplementary volume issued by Prof. Cantor last year. I hope that my footnotes will supply the means of studying in detail the history of mathematics at any specified period should the reader desire to do so.

My thanks are due to various friends and correspondents who have called my attention to points in the previous editions. I shall be grateful for notices of additions or corrections which may occur to any of my readers.

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Note

The fourth edition was stereotyped in 1908, but no material changes have been made since the issue of the second edition in 1893, other duties having, for a few years, rendered it impossible for me to find time for any extensive revision. Such revision and incorporation of recent researches on the subject have now to be postponed till the cost of printing has fallen, though advantage has been taken of reprints to make trivial corrections and additions.

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Contents

Chapter 1

Egyptian and Phoenician Mathematics

The history of mathematics cannot with certainty be traced back to any school or period befor that of the Ionian Greeks. The subsequent history may be divided into three periods, the disnctions between which are tolerably well marked. The first period is that of the history of mathematics under Greek influence, that is discussed in chapters II to VII; the second is that of the mathematics of the middle ages and the renaissance, this is discussed in chapters VIII to XIII; the third is that of modern mathematics, and this is discussed in chapters XIV to XIX.

Although the history of mathematics commences with that of the Ionian schools, there is no doubt that those Greeks who first paid attention to the subject were largely indebted to the previous investigations of the Egyptians and Phoenicians. Our knowledge of the mathematical attainments of those races is imperfect and partly conjectural, but, such as it is, it is here briefly summarised. The definite history begins with the next chapter.

On the subject of prehistoric mathematics, we may observe in the first place that, though all early races which have left records behind them knew something of numeration and mechanics, and though the majority were also acquainted with the elements of land-surveying, yet the rules which they possessed were in general founded only on the results of observation and experiment, and were neither deduced from nor did they form part of any science. The fact then that various nations in the vicinity of Greece had reached a high state of civilisation

does not justify us in assumning that they had studied mathematics.

The only races with whom the Greeks of Asia Minor (amongst whom our history begins) were likely to have come into frequent contact were those inhabiting the eastern littoral of the Mediterranean; and Greek tradition uniformly assigned the specifal development of geometry to the Egyptians, and that of the science of numbers either to the Egyptians or to the Phoenicians. I discuss these subjects separately.

Part I

First Period
Mathematics under Greek Influence

This period begins with the teaching of Tales, circ. 600 B.C., *and ends with the capture of Alexandria by the Mohammedans in or about* 641 A.D. *The characteristic feature of this period is the development of Geometry.*

It will be remembered that I commenced the last chapter by saying that the history of mathematics might be divided into three periods, namely, that of mathematics under Greek influence, that of the mathematics of the middle ages and of the renaissance, and lastly that of modern mathematics. The next four chapters (chapters II, III, IV, and V) deal with the history of mathematics under Greek influence: to these it will be convenient to add one (chapter VI) on the Byzantine school, since through it the results of Greek mathematics were transmitted to western Europe; and another (chapter VII) on the systems of numeration which were ultimately displaced by the system introduced by the Arabs. I should add that many of the dates mentioned in these chapters are not known with certainty, and must be regarded as only approximately correct.

There appeared in December 1921, just before this reprint was struck off, Sir T. L. Heath's work in 2 volumes on the History of Greek Mathematics. This may now be taken as the standard authority for this period.

Chapter 2

The Ionian and Pythagorean Schools Circ. 600 B.C.–400 B.C.