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E. A. Maxwell

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MATHEMATICS**

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# A GATEWAY TO ABSTRACT MATHEMATICS

BY

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## PREFACE

The subject-matter of most of the topics developed in this book is believed to be essentially new, though, of course, the ideas have been both foreshadowed and overtaken by many other writers. The aim is to provide material, familiar in substance but unfamiliar in treatment, that may catch the interest of pupils (and, dare I say, of teachers?) as they cross into the somewhat puzzling world of abstract mathematics. I have often felt that the present plunge into abstraction is too sudden and that there is a need for more elementary work to make the immersion less exhausting.

To carry the subject forward from this stage will be the work of others; the hope is that this book may help to ease the start.

I am very grateful to the staff of the Cambridge University Press for their skill and care, and for the friendly relations that I have always enjoyed with them.

E. A. M.

*Cambridge*  
*March, 1965*

## INTRODUCTION

Few of us pause for long to think about the rules that we apply automatically when performing mathematical calculations, say in arithmetic or algebra. Thus we ‘factorise’

$$ab + ac = a(b + c)$$

or ‘multiply out’

$$(2a + 7b)x = 2ax + 7bx$$

by laws which are so familiar—at any rate by the stage implied by the reading of this book—that no justification seems necessary.

There is no intention here of codifying these laws systematically, except perhaps by inference; the aim is rather to exhibit *alternative* systems of rules for calculation, after which the basic laws themselves may appear both clear and natural.

We propose, then, a process of abstraction, akin to the fundamental ideas on which much so-called ‘modern’ mathematics is based. The important point, though, is that the material itself from which the abstractions are to spring will be selected from topics likely to be familiar to everyone who has studied just enough mathematics to reach ‘O’-level. The great difficulty in introducing ‘modern’ mathematics seems to be the production of a background of experience from which it can start; and the avowed aim of this book is the attempt to foster just such experience.