CONTENTS

PAGE

INTRODUCTION 17

CHAPTER I

THE STUDY OF FORMS 21

1. The Importance of Form
2. Logical Form
3. Structure
4. Form and Content
5. The Value of Analogy
6. Abstraction
7. Concepts
8. Interpretation
9. The Field of Logic
10. Logic and Philosophy

CHAPTER II

THE ESSENTIALS OF LOGICAL STRUCTURE 45

1. Relations and Elements
2. Terms and Degree
3. Propositions
4. Natural Language and Logical Symbolism
5. Some Principles Governing Symbolic Expression
6. The Power of Symbols

CHAPTER III

THE ESSENTIALS OF LOGICAL STRUCTURE (*continued*) 64

1. Context
2. Concepts and Conceptions
3. Formal Context
   The Universe of Discourse
   Constituent Relations

PAGE

4. Truth-Values
5. Related Propositions in a Formal Context
6. Constituent Relations and Logical Relations
7. Systems
   - Deductive
   - Inductive
   - Mixed

CHAPTER IV

GENERALIZATION 82

1. Regularities of a System
2. Variables
3. Values
4. Propositional Forms
5. The Quantifiers (a) and $(\exists a)$
6. General Propositions
7. The Economy of General Propositions
8. The Formality of General Propositions
9. Quantified Terms in Natural Discourse

CHAPTER V

CLASSES 112

1. Individuals and Classes
2. Membership in a Class
3. Concepts and Classes
4. "Defining Forms" of Classes
5. Classes and Sub-Classes
6. The Notion of a "Unit Class"
7. The Notion of a "Null Class"
8. The Notion of a "Universe Class"
9. Identity of Classes
10. The Uniqueness of "1" and "0"

CHAPTER VI

PRINCIPAL RELATIONS AMONG CLASSES 134

1. The Relation of Class-Inclusion
2. Consequences of the Definition of "$<$"
3. Partial Inclusion or Conjunction of Classes

PAGE

4. Joint Inclusion, or Disjunction of Classes
5. The Principle of Dichotomy: A and -A
6. The Importance of Dichotomy: Negation
7. The Ubiquity of the Null Class
8. Complements of Sums and Products
9. Equivalent Expressions

CHAPTER VII

THE UNIVERSE OF CLASSES 157

1. Relations and Predicates
2. Classes as Indispensable Constructs in a System
3. Classes as "Primitive Concepts" in a System
4. The Generalized System of Classes
5. A Convenience of Symbolism: Logical Punctuation

CHAPTER VIII

THE DEDUCTIVE SYSTEM OF CLASSES 182

1. The Class-System as a Deductive System
2. Postulates and Theorems
3. Truth and Validity
4. Postulates for the System of Classes, $K(a, b \ldots)<_2$
5. Relations and Operations
6. Operations as "Primitive Notions"
7. Postulates for the System, $K(a, b \ldots) +, \times; =$
8. The "Calculus" of Classes

CHAPTER IX

THE ALGEBRA OF LOGIC 206

1. The Meaning of "Algebra," and its Relevance to the Class-Calculus
2. Further Discussion of the Postulates
3. Principles of Proof: Substitution, Application, and Inference
4. Elementary Theorems
   Tautology, Absorption, Double Negation, Association
5. The Duality of + and ×

PAGE

6. The Definition of $<$, and Inclusion-Theorems
7. Comparison with Postulates for $K(a, b \ldots)_{<_2}$
8. Fundamental Traits of Boolean Algebra

CHAPTER X

ABSTRACTION AND INTERPRETATION 240

1. Different Degrees of Formalization
2. Properties of Relations
3. Postulates as Formal Definitions of Relations
4. Boolean Algebra: the Calculus of Classes as a Formula
5. Other Interpretations of the Boolean Formula
6. The Two-Valued Algebra

CHAPTER XI

THE CALCULUS OF PROPOSITIONS 266

1. Properties of Logical Relations and Operations
2. Propositional Interpretation of Boolean Algebra
3. The Propositional Calculus as an Algebra of Truth-Values
4. The Notion of "Material Implication"
5. The "Reflexiveness" of a Propositional Calculus
6. The Significance of a Propositional Calculus

CHAPTER XII

THE ASSUMPTIONS OF *PRINCIPIA MATHEMATICA* 287

1. Limitations and Defects of the "Propositional" Algebra
2. Assertion and Negation
3. The Calculus of Elementary Propositions of *Principia Mathematica*
4. The Most Important Theorems Involving $\vee$, $\sim$, and $\supset$
5. The Definition of Conjunction, and Some Important Theorems
6. The Definition of Equivalence, and Some Important Theorems*

PAGE

CHAPTER XIII

LOGISTICS 312

1. The Purpose of Logistics
2. The Primitive Ideas of Mathematics
3. Functions
4. Assumptions for a Calculus of General Propositions
5. The Definitions of "Class" and "Membership"
6. The Definition of "Relation"
7. The Structure of *Principia Mathematica*
8. The Value of Logic for Science and Philosophy

APPENDIX A

SYMBOLIC LOGIC AND THE LOGIC OF THE SYLLOGISM 340

APPENDIX B

PROOFS OF THEOREMS 11a AND 11b 350

APPENDIX C

THE CONSTRUCTION AND USE OF TRUTH-TABLES 352

SUGGESTIONS FOR FURTHER STUDY 356

INDEX 361