Provisional Table of Contents

Preface v

Prologue 1

Chapter 1. A Transition to Abstract Algebra 3
 1.1. A Short History of Algebra 3
 Al-Khwarīzmī 12
 1.2. Basic Algebraic Systems and Properties 14
 François Viète 25
 1.3. Functions, Symmetry, and Modular Arithmetic 27
 Leonard Euler 38
 Supplementary Exercises, Chapter 1 39
 Projects, Chapter 1 41

Chapter 2. Relationships between Systems 44
 2.1 Isomorphisms 44
 2.2 Elements and Subsets 53
 2.3 Direct Products 64
 Bartel van der Waerden 73
 2.4 Homomorphisms 74
 Lagrange 84
 Supplementary Exercises, Chapter 2 86
 Projects, Chapter 2 87

Chapter 3. Groups 89
 3.1. Cyclic Groups 89
 Euclid 96
 Gauss 96
 3.2. Abelian Groups 98
 Leopold Kronecker 106
 3.3. Cayley Digraphs 107
 Arthur Cayley 112
 3.4. Group Actions and Symmetry Groups 113
 3.5. Permutation Groups Part I 124
 3.6. Normal Subgroups and Factor Groups 131
 Evariste Galois 141
 3.7. Permutation Groups Part II 143
 Supplementary Exercises, Chapter 3 151
 Projects, Chapter 3 153

 Chapter 4. Rings. Integral Domains, and Fields 157
 4.1. Rings and Integral Domains 157
 4.2. Ideals and Factor Rings 167
 Emmy Noether 173
 4.3. Maximal and Prime Ideals 174
 Kummer 181
 Supplementary Exercises, Chapter 4 183
 Projects, Chapter 4 185

 Chapter 5. Introduction to Galois Theory (189)

 Chapter 6. Further Topics in Group Theory

 Chapter 7. Further Topics in Abstract Algebra

 Answers to Selected Exercises

 Index