

# Contents

|   |     |
|---|-----|
| <i>Introduction</i>   | 1   |
| 1. The Natural Numbers and Analysis   | 11  |
| §0. Introduction  | 11  |
| §1. The Modal-Structuralist Framework: The Hypothetical Component   | 16  |
| §2. The Categorical Component: An Axiom of Infinity and a Derivation (inspired by Dedekind, with help from Frege) | 24  |
| §3. Justifying the Translation Scheme   | 33  |
| §4. Justification from within   | 38  |
| §5. Extensions  | 44  |
| §6. The Question of Nominalism  | 47  |
| 2. Set Theory   | 53  |
| §0. Introduction  | 53  |
| §1. Informal Principles: Many vs. One   | 57  |
| §2. The Relevant Structures   | 65  |
| §3. Unbounded Sentences: Putnam Semantics   | 73  |
| §4. Axioms of Infinity: Looking back  | 79  |
| §5. Axioms of Infinity: Climbing up   | 83  |
| Appendix  | 92  |
| 3. Mathematics and Physical Reality   | 94  |
| §0. Introduction  | 94  |
| §1. The Leading Ideas   | 97  |
| §2. Carrying the Mathematics of Modern Physics: $RA^2$ as a Framework   | 104 |
| §3. Global Solutions  | 118 |
| §4. "Metaphysical Realist" Commitments? "Synthetic Determination" Relations                                       | 124 |
| §5. A Role for Representation Theorems?   | 135 |
| <i>Bibliography</i>   | 145 |
| <i>Index</i>  | 151 |