

CONTENTS

Preface	vii
1 Problem-Solving	1
Defining a Mathematical Problem.....	2
Semiotics and Mathematics	6
Semiotics and Problem-Solving	10
Teaching Numbers as Signs.....	14
Math Competence	37
2 Problems in Arithmetic	40
Defining an Arithmetical Problem.....	41
Teaching the Basic Operations	45
Teaching Fractions and Decimals	57
Teaching Other Operations.....	62
Arithmetical Competence	68
3 Problems in Algebra	78
Defining an Algebraic Problem.....	79
Teaching the Algebraic Operations	82
Teaching Equations.....	94
Algebraic Competence.....	107
Using Historical Anecdotes	108
4 Story Problems	117
Defining a Story Problem.....	118
A Thematic Typology	123
Inter-Code Translation	135
Conceptual Metaphor Theory	141
Pedagogical Questions	151
5 Geometric and Other Problems	154
Geometry Problems	155
Coordinate Geometry Problems.....	168

Problems in Combinatorics.....	174
Problems in Probability	180
Heuristic Problem-Solving.....	185
6 Semiotic Pedagogy	189
Representing Structure.....	190
The Interconnectedness Principle	195
Logical Strategies	199
Set Theory.....	209
Overview and Reflections	214
Glossary.....	219
References	223
Online Resources.....	231
Index	233