

Contents

1 Transforming the Mathematics Curriculum 1

Transforming the Processes of Mathematics Education 3

Transforming the Content of the Mathematics Curriculum 14

2 Traditional Computer Assisted Instruction 39

Demonstration Programs 39

Drill and Practice and Tutorial Programs 44

Simulation 49

Educational Games 53

Programming 59

Conclusion 62

3 Problem Solving: Transforming a Process 65

Solving Problems, Not Finding Answers 66

Problem Solving Environments 75

Modeling Solutions to Problems 84

Conclusion 93

4 Using Computer Graphics in Mathematics 95

Turtle Graphics 95

The Mathematics of Graphics Programming 120

Special Applications Packages 131

The Future 136

5 Applied Mathematics: Transforming Content 139

Transforming Elementary School Mathematics 142

Transforming High School Mathematics 152

6 Computer Science: Mathematics in the Computer 165

Hierarchies 166

Storage 168

Numbers 171

Alphanumerics 176

Addresses 178

Operations 181

Basic Number Systems 186

Peeks, Pokes, and Calls 192

Machine Language Subroutines 194

Conclusions 194

7 Programming and Computer Languages 197

The Old View—Programming as Language Teaching 197

The New View—Programming as Construction 199

Computer Languages 200

Programs Within Programs 207

The Elements of Languages 211

The Elements of Programs—The Simple Routines 214

Conclusions 214

8 The Mathematics Teacher as Computer Sponsor 217

Three Computer Sponsors 218

Background and Training of a Computer Sponsor 222

Staff Development 223

Creating and Maintaining a Computer Resource Center 225

Curriculum Planning and Development 229

Making and Breaking Images 232

Post Script 235

Glossary 241

Resources 247

Index 305