## CONTENTS

Foreword xi
Barbara J. Reys
Preface and Introduction xii
Abstract Thinking1
Action Research2
Active Mathematics Teaching and Learning3
Additive Reasoning4
Algebraic Reasoning5
Algorithm6
Assessment in Mathematics
Formative Assessment7
Summative Assessment7
Progressive Assessment8
Basic (Number) Facts9
Beliefs/Attitudes
Cognitive Demand
Cognitive Demand
Cognitive Demand
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14   Computer Algebra Systems (CAS) 15
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14   Computer Algebra Systems (CAS) 15   Concept Image 16
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14   Computer Algebra Systems (CAS) 15   Concept Image 16   Conceptual Knowledge 17
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14   Computer Algebra Systems (CAS) 15   Concept Image 16   Conceptual Knowledge 17   Conjecture 18
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14   Computer Algebra Systems (CAS) 15   Concept Image 16   Conceptual Knowledge 17   Conjecture 18   Constructivist Theory of Learning 19
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14   Computer Algebra Systems (CAS) 15   Concept Image 16   Conceptual Knowledge 17   Conjecture 18   Constructivist Theory of Learning 19   Cooperative Learning 21
Cognitive Demand 11   Cognitive Science 12   Cognitively Guided Instruction (CGI) 13   Common Core State Standards for Mathematics (CCSSM) 14   Computer Algebra Systems (CAS) 15   Concept Image 16   Concept ual Knowledge 17   Conjecture 18   Constructivist Theory of Learning 19   Cooperative Learning 21   Council for the Accreditation of Educator Preparation (CAEP) 22
Cognitive Demand11Cognitive Science12Cognitively Guided Instruction (CGI)13Common Core State Standards for Mathematics (CCSSM)14Computer Algebra Systems (CAS)15Concept Image16Conceptual Knowledge17Conjecture18Constructivist Theory of Learning19Cooperative Learning21Council for the Accreditation of Educator Preparation (CAEP)22Counting23

Curricular Reasoning	25
Curriculum	26
Curriculum Alignment	27
Curriculum Coherence	28
Curriculum Knowledge	29
Decentering	30
Deductive Reasoning	31
Design Research in Education	32
Didactic	33
Differentiated Instruction	34
Direct Modeling	35
Discourse	36
Discovery Learning	37
Dynamic Geometry Software (DGS)	39
Educational Technology	40
Epistemology	42
Equity	43
Error Patterns	45
Ethnomathematics	46
Fidelity of Implementation	47
Flipped Classroom	48
Functions-Based Approach to Teaching Algebra	49
Geometric Reasoning	50
High-Stakes Testing	51
Inductive Reasoning	52
Instructional Strategies and Techniques	53
Direct Instruction/Lecture Method	53
Inquiry Based Instruction/Active Learning	53
Three-Act Tasks	53
Launch-Explore-Summarize	54
5 Practices	54
Flipped Classroom Approach	54

Learning Trajectory	55
Lesson Study	56
Longitudinal Study	57
Manipulatives	59
Math Anxiety	61
Math Wars	62
Mathematical Identity	63
Mathematical Knowledge for Teaching (MKT)	65
Mathematical Literacy	67
Mathematical Modeling	68
Mathematics Skills	69
Meaningful Learning	70
Mental Discipline	71
Mental Math	72
Metacognition	73
Misconceptions	74
Model-Eliciting Activities (MEA's)	75
Multiple Embodiment	76
Multiplicative Reasoning	77
National Assessment of Educational Progress (NAEP)	78
NCTM Standards	79
New Math	80
Non-Anticipatory	81
Number Sense/Numeracy	82
Numerical Estimation	83
Pedagogical Content Knowledge (PCK)	84
Performance Based Assessments	85
Prior Knowledge	86
Problem Based Learning (PrBL)	87
Problem Solving Heuristics	88
Problem Structure	89
Procedural Knowledge	90

Productive Struggle	91
Professional Development (PD)	93
Professional Organizations in Mathematics Education	94
National Council of Teachers of Mathematics (NCTM)	94
National Council of Supervisors of Mathematics (NCSM)	94
Association of Mathematics Teacher Educators (AMTE)	94
Psychology of Mathematics Education (PME)	94
American Educational Research Association (AERA)	95
International Commission on Mathematical Instruction (ICMI)	95
Research Council on Mathematics Learning (RCML)	95
Mathematical Association of America (MAA)	95
American Mathematical Society (AMS)	95
Program for International Student Assessment (PISA)	96
Project Based Learning (PBL)	97
Proportional Reasoning	98
Quantitative Literacy (QL)	99
Quantitative Reasoning (QR)	100
Radical Constructivism	101
Reification	102
Relational Thinking	103
Representational Fluency	104
Representations	105
Response to Intervention (Rtl)	106
Responsive Teaching	107
Rigor	108
Rote Learning	109
Scaffolding	110
Sense-Making	111
Situated Learning (Cognition)	112
Social Constructivism	113
Socio-Cultural Learning Theory (SCLT)	114
Sociomathematical Norms	116

## CONTENTS

Spatial Thinking	
Strands of Mathematical Proficiency	118
Subitizing	
Task Analysis	
Teacher Noticing	
Technological and Pedagogical Content Knowledge (TPACK)	122
Trends in Mathematics and Science Study (TIMMS)	
Van Hiele Levels of Geometric Thinking	
Zone of Proximal Development (ZPD)	