

AMTE, in the *Standards for Preparing Teachers of Mathematics*, puts forward a national vision of initial preparation for all Pre-K–12 teachers who teach mathematics. *SPTM* pertains not only to middle and high school mathematics teachers who may teach mathematics exclusively but also to elementary school teachers teaching all disciplines, special education teachers, teachers of emergent multilingual students, and all other teaching professionals and administrators who have responsibility for students' mathematical learning. *SPTM* has broad implications for teacher preparation programs, in which stakeholders include faculty and administrators in both education and mathematics at the university level; teachers, principals, and district leaders in the schools with which preparation programs partner; and the communities in which preparation programs and their school partners are situated.

*SPTM* is intended as a national guide that articulates a vision for mathematics teacher preparation and supports the continuous improvement of teacher preparation programs. Such continuous improvement includes changes to preparation program courses and structures, partnerships involving schools and universities and their leaders, the ongoing accreditation of such programs regionally and nationally, and the shaping of state and national mathematics teacher preparation policy. *SPTM* is also designed to inform accreditation processes for mathematics teacher preparation programs, to influence policies related to preparation of teachers of mathematics, and to promote national dialogue around preparing teachers of mathematics. The vision articulated in *SPTM* is aspirational in that it describes a set of high expectations for developing a well-prepared beginning mathematics teacher who can support meaningful student learning. The vision is research-based and establishes a set of goals for the continued development and refinement of a mathematics teacher preparation program and a research agenda for the study of the effects of such a program.

*SPTM* contains detailed depictions of what a well-prepared beginning teacher knows and is able to do related to content, pedagogy, and disposition, and what a strong preparation program entails with respect to learning experiences, assessments, and partnerships. Stakeholders in mathematics teacher preparation will find messages related to their roles.

*Standards for Preparing Teachers of Mathematics* includes standards and indicators for teacher candidates and for the design of teacher preparation programs. *SPTM* outlines assessment practices related to overall quality, program effectiveness, and candidate performance. *SPTM* describes specific focal practices by grade band and provides guidance to stakeholders regarding processes for productive change.



IAP—Information Age Publishing  
Charlotte, NC 28271  
[www.infoagepub.com](http://www.infoagepub.com)

ISBN 978-1-64113-996-0



9 781641 139960





<b>TABLES</b>	<b>VI</b>
<b>FIGURES</b>	<b>VII</b>
<b>VIGNETTES</b>	<b>VIII</b>
<b>FOREWORD</b>	<b>IX</b>
<b>PREFACE</b>	<b>XI</b>
Purpose	xiii
Audience	xiii
Organization of the Document	xiv
<b>CHAPTER 1. INTRODUCTION</b>	<b>1</b>
Assumptions about Mathematics Teacher Preparation	1
A Well-Prepared Beginning Teacher of Mathematics	4
<b>CHAPTER 2. CANDIDATE KNOWLEDGE, SKILLS, AND DISPOSITIONS</b>	<b>5</b>
Organization of This Chapter	5
What Should Well-Prepared Beginning Teachers of Mathematics Know and Be Able to Do, and What Dispositions Should They Develop?	7
Standard C.1. Mathematics Concepts, Practices, and Curriculum	8
Standard C.2. Pedagogical Knowledge and Practices for Teaching Mathematics	12
Standard C.3. Students as Learners of Mathematics	18
Standard C.4. Social Contexts of Mathematics Teaching and Learning	21
Closing Remarks	24
<b>CHAPTER 3. PROGRAM CHARACTERISTICS TO DEVELOP CANDIDATE KNOWLEDGE, SKILLS, AND DISPOSITIONS</b>	<b>25</b>
Organization of this Chapter	25
Standard P.1. Partnerships	27
Standard P.2. Opportunities to Learn Mathematics	29
Standard P.3. Opportunities to Learn to Teach Mathematics	33
Standard P.4. Opportunities to Learn in Clinical Settings	37
Standard P.5. Recruitment and Retention of Teacher Candidates	41
Closing Remarks	43
<b>CHAPTER 4. ELABORATIONS OF THE STANDARDS FOR THE PREPARATION OF EARLY CHILDHOOD TEACHERS OF MATHEMATICS</b>	<b>45</b>
Part 1. Elaborations of the Knowledge, Skills, and Dispositions Needed by Well-Prepared Beginning Early Childhood Teachers of Mathematics	48
EC.1. Deep Understanding of Early Mathematics	48
EC.2. Positive Attitudes Toward Mathematics and Productive Dispositions Toward Teaching Mathematics	53
EC.3. Mathematics Learning Trajectories: Paths for Excellence and Equity	54



EC.4. Tools, Tasks, and Talk as Essential Pedagogies for Meaningful Mathematics.....	58
EC.5 Understanding Young Children's Mathematical Thinking Informs Teaching .....	61
EC.6. Collaboration With Families Enhances Children's Mathematical Development.....	63
EC.7. Seeing Mathematics Through Children's Eyes.....	64
EC.8. Creating Positive Early Childhood Learning Environments.....	66
Part 2. Elaborations of the Characteristics Needed by Effective Programs Preparing Early Childhood Teachers of Mathematics .....	68
EC.9. Mathematics Content Preparation of Early Childhood Teachers.....	69
EC.10. Mathematics Methods Experiences for Early Childhood Teachers .....	70
EC.11. Clinical Experiences in Mathematics for Early Childhood Teachers .....	71
Closing Remarks.....	72
<b>CHAPTER 5. ELABORATIONS OF THE STANDARDS FOR THE PREPARATION OF UPPER ELEMENTARY GRADES TEACHERS OF MATHEMATICS.....</b>	<b>73</b>
Part 1. Elaborations of the Knowledge, Skills, and Dispositions Needed by Well-Prepared Beginning Teachers of Mathematics in the Upper Elementary Grades .....	75
UE.1. Mathematics Concepts and Connections to Mathematical Practices .....	75
UE.2. Pedagogical Knowledge and Teaching Practices .....	82
UE.3. Tools to Build Student Understanding .....	84
UE.4. Assessment to Promote Learning and Improve Instruction .....	85
UE.5. Students' Sense Making .....	86
UE.6. Ethical Advocates for Students.....	87
Part 2. Elaborations of the Characteristics Needed by Effective Programs Preparing Mathematics Teachers for Upper Elementary Grades.....	89
UE.7. Mathematical Content Preparation of Teachers of Mathematics in the Upper Elementary Grades .....	89
UE.8. Mathematics Methods Coursework for Upper Elementary Teachers of Mathematics.....	90
UE.9. Clinical Experiences for Upper Elementary Teachers of Mathematics .....	91
Closing Remarks.....	92
<b>CHAPTER 6. ELABORATIONS OF THE STANDARDS FOR THE PREPARATION OF MIDDLE LEVEL TEACHERS OF MATHEMATICS .....</b>	<b>93</b>
Part 1. Elaborations of the Knowledge, Skills, and Dispositions Needed by Well-Prepared Beginning Teachers of Mathematics at the Middle Level .....	95
ML.1. Essential Understandings of Mathematics Concepts and Practices .....	95
ML.2. Content Progressions for Middle Level Learners .....	102
ML.3. Strategies to Support Early Adolescents .....	103
ML.4. Meaningful and Interdisciplinary Contexts .....	104
ML.5. Mathematical Practices of Middle Level Learners.....	106
ML.6. Respond to the Needs of Early Adolescents .....	107
ML.7. Equitable Structures and Systems in Middle Schools.....	109
Part 2. Elaborations of the Characteristics Needed by Effective Programs Preparing Middle level Teachers.....	110
ML.8. Mathematics Content Preparation for Teachers of Mathematics at the Middle Level.....	111
ML.9 Pedagogical Preparation for Middle Level Teachers of Mathematics .....	113
ML.10. Clinical Experiences in Middle Level Settings .....	114
Closing Remarks.....	116



## **CHAPTER 7. ELABORATIONS OF THE STANDARDS FOR THE PREPARATION OF HIGH SCHOOL TEACHERS OF MATHEMATICS ..... 117**

Part 1. Elaborations of the Knowledge, Skills, and Dispositions Needed by Well-Prepared Beginning High School Mathematics Teachers .....	120
HS.1. Essential Understandings of Mathematics Concepts and Practices in High School Mathematics .....	122
HS.2. Use of Tools and Technology to Teach High School Mathematics .....	125
HS.3. Supporting Each and Every Student's Opportunity to Learn Mathematics .....	127
HS.4. Cultivating Positive Mathematical Identities in Each and Every Student .....	130
Part 2. Elaborations of the Characteristics Needed by Effective Programs Preparing High School Mathematics Teachers .....	133
HS.5. Effective Programs to Support Preparation of Teachers of Mathematics at the High School Level .....	133
HS.6. Partnerships to Support Preparation of Teachers of Mathematics at the High School Level.....	134
HS.7. Mathematical Content Preparation of Teachers of Mathematics at the High School Level.....	136
HS.8. Ethics and Values for Teaching Mathematics at the High School Level .....	138
HS.9. Mathematics Methods Experiences for Teachers of Mathematics at the High School Level.....	141
HS.10. Clinical Experiences for Teachers of Mathematics at the High School Level .....	142
Closing Remarks.....	144
Potential Pathways for Preparing High School Mathematics Teachers .....	145

## **CHAPTER 8. ASSESSING MATHEMATICS TEACHER PREPARATION ..... 147**

Features of Effective Assessments Used in Mathematics Teacher Preparation .....	151
Recommendation AF.1. Focus on Mathematics Teaching in Assessments .....	151
Recommendation AF.2. Promote Equity and Access in Assessments .....	152
Recommendation AF.3. Embody Openness in Assessments .....	152
Recommendation AF.4. Support Valid Inferences and Action Based on Assessments .....	152
Recommendation AF.5. Embody Coherence and Sustainability in Assessments .....	155
Assessing Quality of Mathematics Teacher Candidates .....	156
Recommendation AC.1. Assessment of Mathematical Knowledge Relevant to Teaching .....	156
Recommendation AC.2. Assessment of Mathematics Teaching Practice .....	157
Recommendation AC.3. Assessment of Dispositions .....	157
Assessing Quality of Mathematics Teacher Preparation Programs .....	158
Recommendation AP.1. Assessment of Stakeholder Engagement .....	158
Recommendation AP.2. Assessment of Program Curriculum and Instruction .....	159
Recommendation AP.3. Assessment of Effective Clinical Experiences .....	159
Recommendation AP.4. Assessment of Recruitment and Retention .....	160
Closing Remarks.....	162

## **CHAPTER 9. ENACTING EFFECTIVE PREPARATION OF TEACHERS OF MATHEMATICS ..... 163**

Improving the Preparation of Teachers of Mathematics .....	163
Process for Supporting Improvement of Mathematics Teacher Preparation .....	164
A Call to Action .....	166
Closing Remarks.....	167

## **REFERENCES..... 169**