Competencies for Middle Childhood Teachers: MATHEMATICS, Grades 4-8

2014

In addition to the Arkansas Teaching Standards, the teacher of middle childhood mathematics, grades 4-8, shall demonstrate knowledge and competencies in the following areas:

1. Operations and Algebraic Thinking (OA) AMLE: 2a,2b CCSS-MATH: OA, 4-5 NCTM: Grades 3-5 Expectations	1.1 Knowledge of operations and properties of the real number system 1.2 Knowledge of how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems 1.3 Knowledge of a variety of strategies to determine the reasonableness of results 1.4 Knowledge of how to generate, recognize and represent, and analyze sequences or patterns (e.g., arithmetic, geometric) 1.5 Knowledge of how to interpret geometric relationships in the xy-plane (e.g., transformations, distance, midpoint)
2. Number and Operations in Base-10 (NBT) AMLE: 2a,2b CCSS-MATH: NBT, 4-5 NCTM: Grades 3-5 Expectations	2.1 Knowledge of operations and properties of the real number system 2.2 Ability to understand the place value system and the relationships among fractions, decimals, and percents
3. Number and Operations – Fractions (NF) AMLE: 2a,2b CCSS-MATH: NF, 4-5 NCTM: Grades 3-5 Expectations	3.1 Knowledge of operations, ordering and properties of the real number system 3.2 Ability to understand the relationships among fractions, decimals, and percents (e.g., equivalent fractions, representations using various models) 3.3 Knowledge of how to use proportional relationships to solve real-world problems
4. Ratios and Proportional Relationships (RP) AMLE: 2a,2b CCSS-MATH: RP, 6-7 NCTM: Grades 3-5 Expectations	4.1 Knowledge of how to use ratio reasoning to solve problems 4.2 Knowledge of how to use proportional relationships to solve real-world problems
5. The Number System (NS) AMLE: 2a,2b CCSS-MATH: NS, 6-8 NCTM: Grades 3-5 Expectations	5.1 Ability to understand operations and properties of the real number system (e.g., rational and irrational numbers) 5.2 Ability to understand the relationships among fractions, decimals, and percents 5.3 Knowledge of how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems 5.4 Knowledge of a variety of strategies to determine the reasonableness of results 5.5 Knowledge of how to interpret geometric relationships in the xy-plane (e.g., transformations, distance, midpoint)

ATS (InTASC) = 2011 Arkansas Teaching Standards (Interstate Teacher Assessment and Support consortium)
AMLE = 2012 Association for Middle Level Education
CCSS-Math = 2010 Common Core State Standards – Mathematics
NCTM = 2000 National Council of Teachers of Mathematics
Praxis II (5169) = Praxis II Middle School: Mathematics

6. Number and Quantity (NQ) AMLE: 2a,2b CCSS-MATH: NQ, HS NCTM: Grades 3-5 Expectations	6.1 Ability to understand operations and properties of the real number system 6.2 Ability to understand the relationships among fractions, decimals, and percent 6.3 Knowledge of how to use ratio reasoning to solve problems 6.4 Knowledge of how to use proportional relationships to solve real-world problems 6.5 Knowledge of how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems 6.6 Knowledge of a variety of strategies to determine the reasonableness of results
7. Algebra (A) AMLE: 2a,2b CCSS-MATH: A, HS NCTM: Grades 3-5 Expectations	7.1 Knowledge of how to evaluate and manipulate algebraic expressions, equations, and formulas 7.2 Knowledge of how to recognize, represent, and create linear relationships algebraically 7.3 Knowledge of how to solve linear equations and inequalities 7.4 Knowledge of how to represent and solve nonlinear equations and inequalities 7.5 Knowledge of how to represent and solve systems of equations and inequalities
8. Expressions and Equations (EE) AMLE: 2a,2b CCSS-MATH: EE, 6-8 NCTM: Grades 3-5 Expectations	8.1 Ability to understand operations and properties of the real number system 8.2 Knowledge of a variety of strategies to determine the reasonableness of results 8.3 Knowledge of how to evaluate and manipulate algebraic expressions, equations, and formulas 8.4 Knowledge of how to recognize and represent linear relationships algebraically 8.5 Knowledge of how to solve linear equations and inequalities 8.6 Knowledge of how to represent and solve systems of equations and inequalities 8.7 Ability to understand basic characteristics of linear functions (e.g., slope, intercepts) 8.8 Ability to understand the relationships among functions, tables, and graphs. (e.g., radicals, integer exponents) 8.9 Knowledge of how to analyze and represent functions that model given information
9. Functions (F) AMLE: 2a,2b CCSS-MATH: F, 8 NCTM: Grades 3-5 Expectations	9.1 Knowledge of how to recognize and represent sequences or patterns (e.g., arithmetic, geometric) 9.2 Knowledge of how to identify, define, compare, and evaluate functions 9.3 Knowledge of how to determine and interpret the domain and the range of a function numerically, graphically, and

	algebraically 9.4 Ability to understand basic characteristics of linear functions (e.g., slope, intercepts) 9.5 Ability to understand the relationships among functions, tables, and graphs 9.6 Knowledge of how to analyze and represent functions that model given information
10. Modeling (M) AMLE: 2a,2b CCSS-MATH: M, HS NCTM: Grades 3-5 Expectations	10.1 Knowledge of a variety of strategies to determine the reasonableness of results 10.2 Knowledge of how to analyze and represent functions that model given information 10.3 Knowledge of how to model and solve problems using simple diagrams, flowcharts, or algorithms
11. Measurement and Data (MD) AMLE: 2a,2b CCSS-MATH: MD, 4-5 NCTM: Grades 3-5 Expectations	11.1 Knowledge of how to solve problems involving perimeter, area, surface area, and volume 11.2 Ability to understand properties of quadrilaterals (e.g., rectangle, rhombus, trapezoid) and other polygons 11.3 Ability to understand systems of measurement (e.g., metric, customary) 11.4 Knowledge of how to interpret and analyze data presented in various forms
12. Geometry (G) AMLE: 2a,2b CCSS-MATH: G, 4-8, HS NCTM: Grades 3-5 Expectations	12.1 Knowledge of how to use ratio reasoning to solve problems 12.2 Knowledge of how to solve problems involving perimeter, area, surface area, and volume 12.3 Ability to understand the concepts of similarity and congruence 12.4 Ability to understand properties of lines (e.g., parallel, perpendicular, intersecting) and angles 12.5 Ability to understand properties of triangles 12.6 Ability to understand properties of quadrilaterals (e.g., rectangle, rhombus, trapezoid) and other polygons 12.7 Ability to understand properties of circles 12.8 Knowledge of how to interpret geometric relationships in the xy-plane (e.g., transformations, distance, midpoint) 12.9 Ability to understand how geometric constructions are made 12.10 Ability to understand the basic concepts of trigonometry (e.g., the unit circle, right triangle trigonometry)
13. Statistics and Probability (SP) AMLE: 2a,2b CCSS-MATH: SP, 6-8, HS NCTM: Grades 3-5 Expectations	13.1 Knowledge of how to interpret and analyze data presented in various forms 13.2 Knowledge of how to represent data in various forms 13.3 Knowledge of how to develop, use, and evaluate probability models 13.4 Ability to understand concepts associated with measures of

	central tendency and dispersion (e.g., spread) 13.5 Knowledge of how to model and solve problems using simple diagrams, flowcharts, or algorithms
14. Mathematical Practices ACEI: 2.1	Standard 14: To be prepared to develop student mathematical proficiency, all mathematics teachers should know how to develop student expertise in the content area incorporating the following Standards for Mathematical Practice throughout all 4-8 mathematics by 14.1 Making sense of problems and persevering in solving them 14.2 Reasoning abstractly and quantitatively 14.3 Constructing viable arguments and critiquing the reasoning of others 14.4 Modeling with mathematics 14.5 Using appropriate tools strategically 14.6 Attending to precision 14.7 Looking for and making use of structure 14.8 Looking for and expressing regularity in repeated reasoning