

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

2016

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:

<p>1. Operations and Algebraic Thinking (OA) AMLE: 2a,2b,2c K-5AMS: OA, 4-5 NCTM: Grades 3-5 Expectations</p>	<p>1.1 Ability to understand operations and properties of the real number system 1.2 Ability to understand how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems 1.3 Ability to understand a variety of strategies to determine the reasonableness of results 1.4 Ability to understand how to generate, recognize and represent, and analyze sequences or patterns (e.g., arithmetic, geometric) 1.5 Ability to understand how to interpret geometric relationships in the xy-plane (e.g., transformations, distance, midpoint) 1.6 Ability to understand how to model and solve problems using operations and algebraic thinking in real-world situations</p>
<p>2. Number and Operations in Base-10 (NBT) AMLE: 2a,2b,2c K-5AMS: NBT, 4-5 NCTM: Grades 3-5 Expectations</p>	<p>2.1 Ability to understand operations and properties of the real number system, including concrete models 2.2 Ability to understand the place value system and the relationships among fractions, decimals, and percents 2.3 Ability to understand how to model and solve problems using number and operations in base-10 in real-world situations</p>
<p>3. Number and Operations – Fractions (NF) AMLE: 2a,2b,2c K-5AMS: NF, 4-5 NCTM: Grades 3-5 Expectations</p>	<p>3.1 Ability to understand 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 Ability to understand how to use proportional relationships to solve real-world problems, including geometric relationships 3.4 Ability to understand how to model and solve problems using number and operations - fractions in real-world situations</p>
<p>4. Ratios and Proportional Relationships (RP) AMLE: 2a,2b,2c 6-8AMS: RP, 6-7 NCTM: Grades 3-5 6-8 Expectations</p>	<p>4.1 Ability to understand how to use ratio reasoning to solve problems 4.2 Ability to understand how to use proportional relationships to solve real-world problems, including coordinate planes 4.3 Ability to understand how to model and solve problems using ratios and proportional relationships in real-world situations</p>

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<p>5. The Number System (NS)</p> <p>AMLE: 2a,2b,2c 6-8AMS: NS, 6-8 NCTM: Grades 3-5 6-8 Expectations</p>	<p>5.1 Ability to understand operations and properties of the real number system (e.g., rational and irrational numbers)</p> <p>5.2 Ability to understand the relationships among fractions, decimals, and percents</p> <p>5.3 Ability to understand how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems</p> <p>5.4 Ability to understand a variety of strategies to determine the reasonableness of results</p> <p>5.5 Ability to understand how to interpret geometric relationships in the xy-plane</p> <p>5.6 Ability to understand and solve real-world situations using the number system</p> <p>5.7 Ability to understand how to model and solve problems using the number system in real-world situations</p>
<p>6. Number and Quantity (NQ)</p> <p>AMLE: 2a,2b,2c HSAMS: NQ</p>	<p>6.1 Ability to understand operations and properties of the real number system</p> <p>6.2 Ability to understand the relationships among fractions, decimals, and percent</p> <p>6.3 Ability to understand how to use ratio reasoning to solve problems</p> <p>6.4 Ability to understand how to use proportional relationships to solve real-world problems</p> <p>6.5 Ability to understand how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems</p> <p>6.6 Ability to understand a variety of strategies to determine the reasonableness of results</p> <p>6.7 Ability to understand how to model and solve problems using number and quantity in real-world situations</p>
<p>7. Algebra (A)</p> <p>AMLE: 2a,2b,2c HSAMS: A,</p>	<p>7.1 Ability to understand how to evaluate and manipulate algebraic expressions, equations, and formulas</p> <p>7.2 Ability to understand how to recognize, represent, and create linear relationships algebraically</p> <p>7.3 Ability to understand how to solve linear equations and inequalities</p> <p>7.4 Ability to understand how to represent and solve nonlinear equations and inequalities</p> <p>7.5 Ability to understand how to represent and solve systems of equations and inequalities</p> <p>7.6 Ability to understand how to model and solve problems using</p>

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	algebra in real-world situations
8. Expressions and Equations (EE) AMLE: 2a,2b,2c 6-8AMS: EE, 6-8 NCTM: Grades 6-8 Expectations	8.1 Ability to understand operations and properties of the real number system 8.2 Ability to understand a variety of strategies to determine the reasonableness of results 8.3 Ability to understand how to evaluate and manipulate algebraic expressions, equations, and formulas 8.4 Ability to understand how to recognize and represent linear relationships algebraically 8.5 Ability to understand how to solve linear equations and inequalities 8.6 Ability to understand 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 Ability to understand how to analyze and represent functions that model given information 8.10 Ability to understand how to model and solve problems using expressions and equations in real-world situations
9. Functions (F) AMLE: 2a,2b,2c 6-8AMS: F, 8 NCTM: Grades 6-8 Expectations	9.1 Ability to understand how to recognize and represent sequences or patterns (e.g., arithmetic, geometric) 9.2 Ability to understand how to identify, define, compare, and evaluate functions 9.3 Ability to understand 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 Ability to understand how to analyze and represent functions that model given information 9.7 Ability to understand how to model and solve problems using functions in real-world situations
10. Modeling (M) AMLE: 2a,2b,2c	10.1 Ability to understand a variety of strategies to determine the reasonableness of results 10.2 Ability to understand how to model and solve problems in real-world situations

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<p>11. Measurement and Data (MD) AMLE: 2a,2b,2c K-5AMS: MD, 4-5 NCTM: Grades 3-5 Expectations</p>	<p>11.1 Ability to understand how to solve problems involving perimeter, area, surface area, and volume 11.2 Ability to understand attributes of quadrilaterals (e.g., rectangle, rhombus, trapezoid) and other polygons and solids 11.3 Ability to understand systems of measurement (e.g., metric, customary, angular) 11.4 Ability to understand how to interpret and analyze data presented in various forms 11.5 Ability to understand how to model and solve problems using measurement and data in real-world situations</p>
<p>12. Geometry (G) AMLE: 2a,2b,2c HSAMS: G, 4-8 NCTM: Grades 6-8 Expectations</p>	<p>12.1 Ability to understand how to use ratio reasoning to solve problems 12.2 Ability to understand 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 Ability to understand 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) 12.11 Ability to understand concepts of a line and rotational symmetry 12.12 Ability to understand how to model and solve problems using geometry in real-world situations</p>
<p>13. Statistics and Probability (SP) AMLE: 2a,2b,2c HSAMS: SP, 6-8, HS</p>	<p>13.1 Ability to understand how to interpret and analyze data presented in various forms 13.2 Ability to understand how to represent data in various forms 13.3 Ability to understand how to develop, use, and evaluate probability models 13.4 Ability to understand statistical concepts and evaluate inferences associated with statistics (e.g., spread) 13.5 Ability to understand how to model and solve problems using diagrams or algorithms</p>

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	13.6 Ability to understand how to model and solve problems using statistics and probability in real-world situations
14. Mathematical Practices CCSS-M Mathematical Practices 1-8	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

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