

MINNESOTA TEACHER LICENSURE EXAMINATIONSSM (MTLESM)

**MIDDLE LEVEL MATHEMATICS (GRADES 5–8)
MATCH STUDY
MAY 2020**

Objective	Minnesota Academic Standards Mathematics K–12	Minnesota Administrative Rules 8710.3320 Middle Level License for Teachers of Mathematics	NCTM CAEP Standards—Middle (Initial Preparation)	Mathematics Content for Middle Grades Addendum to the NCTM CAEP Standards
<p align="center">1</p>	<p><u>Number and Operation</u></p> <p>Grade 5: Divide multi-digit numbers; solve real-world and mathematical problems using arithmetic.</p> <p>Grade 5: Read, write, represent and compare fractions and decimals; recognize and write equivalent fractions; convert between fractions and decimals; use fractions and decimals in real-world and mathematical situations.</p> <p>Grade 5: Add and subtract fractions, mixed numbers and decimals to solve real-world and mathematical problems.</p> <p>Grade 6: Read, write, represent and compare positive rational numbers expressed as fractions, decimals, percent and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations.</p> <p>Grade 6: Understand the concept of ratio and its relationship to fractions and to the multiplication and division of whole numbers. Use ratios to solve real-world and mathematical problems.</p> <p>Grade 6: Multiply and divide decimals, fractions and mixed numbers; solve real-world and mathematical problems using arithmetic with positive rational numbers.</p> <p>Grade 7: Read, write, represent and compare positive and negative rational numbers, expressed as integers, fractions and decimals.</p>	<p>Subp. 3: Subject-matter standards: C.(1), (3)</p>	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-b</p>	<p>B.1.Number Systems: B.1.1</p>

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	<p>Grade 7: Calculate with positive and negative rational numbers, and rational numbers with whole number exponents, to solve real-world and mathematical problems.</p> <p>Grade 8: Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.</p>			
2	<p><u>Number and Operation</u></p> <p>Grade 5: Divide multi-digit numbers; solve real-world and mathematical problems using arithmetic.</p> <p>Grade 5: Add and subtract fractions, mixed numbers and decimals to solve real-world and mathematical problems.</p> <p>Grade 6: Read, write, represent and compare positive rational numbers expressed as fractions, decimals, percent and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations.</p> <p>Grade 6: Multiply and divide decimals, fractions and mixed numbers; solve real-world and mathematical problems using arithmetic with positive rational numbers.</p> <p>Grade 7: Read, write, represent and compare positive and negative rational numbers, expressed as integers, fractions and decimals.</p> <p>Grade 7: Calculate with positive and negative rational numbers, and rational numbers with whole number exponents, to solve real-world and mathematical problems.</p> <p>Grade 8: Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.</p>	Subp. 3: Subject-matter standards: C.(1), (3)	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-b</p>	<p>B.1.Number Systems: B.1.2</p>

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	<p><u>Algebra</u></p> <p>Grade 5: Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving whole numbers.</p> <p>Grade 6: Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving positive rational numbers.</p> <p>Grade 8: Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.</p>			
3	<p><u>Number and Operation</u></p> <p>Grade 5: Divide multi-digit numbers; solve real-world and mathematical problems using arithmetic.</p> <p>Grade 5: Add and subtract fractions, mixed numbers and decimals to solve real-world and mathematical problems.</p> <p>Grade 6: Read, write, represent and compare positive rational numbers expressed as fractions, decimals, percent and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations.</p> <p>Grade 6: Understand the concept of ratio and its relationship to fractions and to the multiplication and division of whole numbers. Use ratios to solve real-world and mathematical problems.</p> <p>Grade 6: Multiply and divide decimals, fractions and mixed numbers; solve real-world and mathematical problems using arithmetic with positive rational numbers.</p>	Subp. 3: Subject-matter standards: C.(1), (3)-(6)	Standard 1: Content Knowledge: 1a Standard 2: Mathematical Practices: 2a-d	B.1.Number Systems: B.1.3

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	<p>Grade 7: Read, write, represent and compare positive and negative rational numbers, expressed as integers, fractions and decimals.</p> <p>Grade 7: Calculate with positive and negative rational numbers, and rational numbers with whole number exponents, to solve real-world and mathematical problems.</p> <p>Grade 8: Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.</p> <p><u>Algebra</u></p> <p>Grade 5: Understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems.</p> <p>Grade 6: Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 7: Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.</p> <p>Grade 7: Represent real-world and mathematical situations using equations with variables. Solve equations symbolically, using the properties of equality. Also solve equations graphically and numerically. Interpret solutions in the original context.</p>			

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	<p>Grade 8: Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.</p> <p>Grade 8: Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.</p> <p><u>Geometry and Measurement</u></p> <p>Grade 6: Calculate perimeter, area, surface area and volume of two- and three-dimensional figures to solve real-world and mathematical problems.</p> <p>Grade 6: Understand and use relationships between angles in geometric figures.</p> <p>Grade 6: Choose appropriate units of measurement and use ratios to convert within measurement systems to solve real-world and mathematical problems.</p> <p><u>Data and Analysis</u></p> <p>Grade 7: Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.</p> <p>Grade 7: Display and interpret data in a variety of ways, including circle graphs and histograms.</p> <p>Grade 8: Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.</p>			

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4	<p><u>Number and Operation</u></p> <p>Grade 7: Calculate with positive and negative rational numbers, and rational numbers with whole number exponents, to solve real-world and mathematical problems.</p> <p><u>Algebra</u></p> <p>Grade 5: Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 6: Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 7: Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.</p> <p>Grade 7: Apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols; evaluate such expressions.</p> <p>Grade 8: Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.</p>	Subp. 3: Subject-matter standards: C.(1)-(3)	Standard 1: Content Knowledge: 1a Standard 2: Mathematical Practices: 2a-d	B.2.Algebra: B.2.1-B.2.4

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	<p>Grade 8: Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.</p> <p>Grade 8: Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.</p> <p><u>Data and Analysis</u></p> <p>Grade 8: Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.</p>			
5	<p><u>Algebra</u></p> <p>Grade 5: Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 5: Understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems.</p> <p>Grade 6: Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 6: Understand and interpret equations and inequalities involving variables and positive rational numbers. Use equations and inequalities to represent real-world and mathematical problems; use the idea of maintaining equality to solve equations. Interpret solutions in the original context.</p>	Subp. 3: Subject-matter standards: C.(1), (3)	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-d</p> <p>Standard 5: Impact on Student Learning: 5a</p>	B.2.Algebra: B.2.1-B.2.4

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	<p>Grade 7: Understand the concept of proportionality in real-world and mathematical situations, and distinguish between proportional and other relationships.</p> <p>Grade 7: Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.</p> <p>Grade 7: Apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols; evaluate such expressions.</p> <p>Grade 7: Represent real-world and mathematical situations using equations with variables. Solve equations symbolically, using the properties of equality. Also solve equations graphically and numerically. Interpret solutions in the original context.</p> <p>Grade 8: Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.</p> <p>Grade 8: Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.</p> <p>Grade 8: Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.</p>			

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	<p><u>Data Analysis</u></p> <p>Grade 8: Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.</p>			
6	<p><u>Algebra</u></p> <p>Grade 5: Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 5: Understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems.</p> <p>Grade 6: Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, table, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 6: Understand and interpret equations and inequalities involving variables and positive rational numbers. Use equations and inequalities to represent real-world and mathematical problems; use the idea of maintaining equality to solve equations. Interpret solutions in the original context.</p> <p>Grade 7: Understand the concept of proportionality in real-world and mathematical situations, and distinguish between proportional and other relationships.</p>	Subp. 3: Subject-matter standards: C.(1), (3)	Standard 1: Content Knowledge: 1a Standard 2: Mathematical Practices: 2a-d	B.2.Algebra: B.2.1-B.2.4

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	<p>Grade 7: Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.</p> <p>Grade 7: Apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols; evaluate such expressions.</p> <p>Grade 7: Represent real-world and mathematical situations using equations with variables. Solve equations symbolically, using the properties of equality. Also solve equations graphically and numerically. Interpret solutions in the original context.</p> <p>Grade 8: Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.</p> <p>Grade 8: Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.</p> <p>Grade 8: Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.</p>			

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	<p><u>Data Analysis</u></p> <p>Grade 8: Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.</p>			
7	<p><u>Algebra</u></p> <p>Grade 5: Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 5: Understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems.</p> <p>Grade 6: Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, table, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 7: Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.</p> <p>Grade 7: Apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols; evaluate such expressions.</p>	Subp. 3: Subject-matter standards: C.(1), (3)	Standard 1: Content Knowledge: 1a Standard 2: Mathematical Practices: 2a-d	B.2.Algebra: B.2.1-B.2.4 B.5.Calculus: B.5.1, B.5.2

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	<p>Grade 7: Represent real-world and mathematical situations using equations with variables. Solve equations symbolically, using the properties of equality. Also solve equations graphically and numerically. Interpret solutions in the original context.</p> <p>Grade 8: Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.</p> <p>Grade 8: Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.</p> <p>Grade 8: Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.</p>			
8	<p><u>Geometry and Measurement</u></p> <p>Grade 5: Determine the area of triangles and quadrilaterals; determine the surface area and volume of rectangular prisms in various contexts.</p> <p>Grade 6: Calculate perimeter, area, surface area and volume of two- and three-dimensional figures to solve real-world and mathematical problems.</p> <p>Grade 6: Understand and use relationships between angles in geometric figures.</p> <p>Grade 6: Choose appropriate units of measurement and use ratios to convert within measurement systems to solve real-world and mathematical problems.</p>	Subp. 3: Subject-matter standards: C.(3), (4)	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-d</p>	<p>B.1.Number Systems: B.1.3</p> <p>B.3.Geometry and Trigonometry: B.3.2-B.3.4, B.3.6-B.3.7, B.3.9</p>

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	<p>Grade 7: Use reasoning with proportions and ratios to determine measurements, justify formulas and solve real-world and mathematical problems involving circles and related geometric figures.</p> <p>Grade 7: Analyze the effect of change of scale, translations and reflections on the attributes of two-dimensional figures.</p> <p>Grade 8: Solve problems involving right triangles using the Pythagorean Theorem and its converse.</p>			
<p>9</p>	<p><u>Geometry and Measurement</u></p> <p>Grade 5: Describe, classify, and draw representations of three-dimensional figures.</p> <p>Grade 5: Determine the area of triangles and quadrilaterals; determine the surface area and volume of rectangular prisms in various contexts.</p> <p>Grade 6: Calculate perimeter, area, surface area and volume of two- and three-dimensional figures to solve real-world and mathematical problems.</p> <p>Grade 6: Understand and use relationships between angles in geometric figures.</p> <p>Grade 7: Use reasoning with proportions and ratios to determine measurements, justify formulas and solve real-world and mathematical problems involving circles and related geometric figures.</p> <p>Grade 7: Analyze the effect of change of scale, translations and reflections on the attributes of two-dimensional figures.</p>	<p>Subp. 3: Subject-matter standards: C.(3), (4)</p>	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-d</p>	<p>B.1.Number Systems: B.1.3</p> <p>B.3.Geometry and Trigonometry: B.3.1, B.3.3, B.3.6-B.3.9</p>

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10	<p><u>Geometry and Measurement</u></p> <p>Grade 6: Calculate perimeter, area, surface area and volume of two- and three-dimensional figures to solve real-world and mathematical problems.</p> <p>Grade 7: Analyze the effect of change of scale, translations and reflections on the attributes of two-dimensional figures.</p> <p>Grade 8: Solve problems involving right triangles using the Pythagorean Theorem and its converse.</p> <p>Grade 8: Solve problems involving parallel and perpendicular lines on a coordinate system.</p>	Subp. 3: Subject-matter standards: C.(4)	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-d</p>	B.3.Geometry and Trigonometry: B.3.2-B.3.3, B.3.6, B.3.8-B.3.9
11	<p><u>Data Analysis and Probability</u></p> <p>Grade 5: Display and interpret data; determine mean, median and range.</p> <p>Grade 7: Use mean, median and range to draw conclusions about data and make predictions.</p> <p>Grade 7: Display and interpret data in a variety of ways, including circle graphs and histograms.</p> <p>Grade 8: Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.</p>	Subp. 3: Subject-matter standards: C.(5)	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-d</p>	B.4.Statistics and Probability: B.4.1-B.4.3
12	<p><u>Data Analysis and Probability</u></p> <p>Grade 6: Use probabilities to solve real-world and mathematical problems; represent probabilities using fractions, decimals and percents.</p> <p>Grade 7: Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.</p>	Subp. 3: Subject-matter standards: C.(5), (6)	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-d</p>	B.4.Statistics and Probability: B.4.1-B.4.2, B.4.4-B.4.5

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13	<p><u>Algebra</u></p> <p>Grade 5: Recognize and represent patterns of change; use patterns, tables, graphs, and rules to solve real-world and mathematical problems.</p> <p>Grade 6: Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p> <p>Grade 8: Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.</p> <p>Grade 8: Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.</p> <p><u>Data Analysis and Probability</u></p> <p>Grade 6: Use probabilities to solve real-world and mathematical problems; represent probabilities using fractions, decimals and percents.</p>	Subp. 3: Subject-matter standards: C.(2)	<p>Standard 1: Content Knowledge: 1a</p> <p>Standard 2: Mathematical Practices: 2a-d</p>	<p>B.1.Number Systems: B.1.1, B.1.4</p> <p>B.2.Algebra: B.2.2-B.2.4</p>
14	N/A	Subp. 3: Subject-matter standards: D.(1), (2)	N/A	N/A

Note: Per the Minnesota Board of Teaching Rules and Standards, the content-area tests for the Minnesota Teacher Licensure Examinations (MTLE) are to measure primarily the content-area knowledge of candidates for teacher licensure. Pedagogical knowledge and skills are assessed through other means, such as the three pedagogical examinations: Early Childhood, Elementary, and Secondary.