

NEBRASKA MATHEMATICS STANDARDS

*Draft for Public Input
April 3, 2015*

NUMBER: Students will communicate number concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

**Numeric Relationships
Operations**

ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

**Algebraic Relationships
Algebraic Processes
Applications**

GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

**Characteristics
Analytic Geometry
Measurement**

DATA: Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

**Representations
Analysis & Applications
Probability**

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NEBRASKA MATHEMATICAL PROCESSES

The Nebraska Mathematical Processes reflect overarching processes that students should master as they work towards college and career readiness. The Nebraska Mathematical Processes reflect the interaction of skills necessary for success in math coursework as well as the ability to apply math knowledge and processes within real-world contexts. The processes highlight the applied nature of math within the workforce and clarify the expectations held for the use of mathematics in and outside of the classroom.

1. Solves mathematical problems.

Through the use of appropriate academic and technical tools, students will make sense of mathematical problems and persevere in solving them. Students will draw upon their prior knowledge in order to employ critical thinking skills, reasoning skills, creativity, and innovative ability. Additionally, students will compute accurately and determine the reasonableness of solutions.

2. Models and represents mathematical problems.

Students will analyze relationships in order to create mathematical models given a real-world situation or scenario. Conversely, students will describe situations or scenarios given a mathematical model.

3. Communicates mathematical ideas effectively.

Students will communicate mathematical ideas effectively and appropriately critique the reasoning of others as well as provide mathematical justifications. Students will utilize appropriate communication approaches individually and collectively and through multiple methods, including writing, speaking, and listening.

4. Makes mathematical connections.

Students will connect mathematical knowledge, ideas, and skills beyond the math classroom. This includes the connection of mathematical ideas to other topics within mathematics and to other content areas. Additionally, students will be able to describe the connection of mathematical knowledge and skills to their career interest as well as within authentic/real-world contexts.

MA K - 12.1 NUMBER: Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
<p>MA.0.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers within the base-ten number system.</p>	<p>MA.1.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers within the base-ten number system.</p>	<p>MA.2.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers within the base-ten number system.</p>	<p>MA.3.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among whole numbers and simple fractions within the base-ten number system.</p>	<p>MA.4.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among fractions and decimals within the base-ten number system.</p>	<p>MA.5.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among fractions and decimals and within the base-ten number system.</p>
<p>MA 0.1.1.a Perform the counting sequence by counting forward from any given number to 100, by ones. Count by tens to 100 starting at any decade number.</p>	<p>MA 1.1.1.a Count to 120 by ones and tens, starting at any given number.</p>	<p>MA 2.1.1.a Count within 1000, including skip-counting by 5s, 10s, and 100s starting at a variety of multiples of 5, 10 or 100.</p>	<p>MA 3.1.1.a Read, write and demonstrate multiple equivalent representations for numbers up to 100,000 using objects, visual representations, including standard form, word form, expanded form and expanded notation.</p>	<p>MA 4.1.1.a Read, write, and demonstrate multiple equivalent representations for whole numbers up to one million and decimals to the hundredths, using objects, visual representations, standard form, word form, and expanded notation.</p>	<p>MA 5.1.1.a Determine multiple equivalent representations for whole numbers and decimals through the thousandths place using standard form, word form, and expanded notation.</p>
<p>MA 0.1.1.b Demonstrate cardinality (i.e., the last number name said indicates the number of objects counted), regardless of the arrangement or order in which the objects were counted.</p>	<p>MA 1.1.1.b Read and write numerals within the range of 0 – 120.</p>	<p>MA 2.1.1.b Read and write numbers within the range of 0 – 1,000 using standard, word, and expanded forms.</p>	<p>MA 3.1.1.b Compare whole numbers through the hundred thousands and represent the comparisons using the symbols $>$, $<$ or $=$.</p>	<p>MA 4.1.1.b Recognize the value of each place-value position as 10 times the position to the right and as one-tenth of the value of the place to its left.</p>	<p>MA 5.1.1.b Compare whole numbers, fractions, mixed numbers, and decimals through the thousandths place and represent comparisons using symbols $<$, $>$, or $=$.</p>

MA 0.1.1.c Use one-to-one correspondence (pairing each object with one and only one spoken number name, and each spoken number name with one and only one object) when counting objects to show the relationship between numbers and quantities of 0 to 20.	MA 1.1.1.c Write numerals to match a representation of a given set of objects for numbers up to 120.	MA 2.1.1.c Demonstrate that each digit of a three-digit number represents amounts of hundreds, tens and ones, e.g., 387 is 3 hundreds, 8 tens, 7 ones.	MA 3.1.1.c Round a whole given number to tens and hundreds using place value understanding and visual representation.	MA 4.1.1.c Classify a number up to 100 as prime or composite.	MA 5.1.1.c Round whole numbers and decimals to any given place.
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MA K - 12.1 NUMBER: Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships
MA 0.1.1.d Demonstrate the relationship between numbers, knowing each sequential number name refers to a quantity that is one larger.	MA 1.1.1.d Demonstrate that each digit of a two-digit number represents amounts of tens and ones, knowing 10 can be considered as one unit made of ten ones which is called a “ten” and any two-digit number can be composed of some tens and some ones (e.g., 19 is one ten and nine ones, 83 is 8 tens and 3 ones) and can be recorded as an equation (e.g., $19 = 10 + 9$).	MA 2.1.1.d Demonstrate that 100 represents a group of ten tens.	MA 3.1.1.d Represent and understand a fraction as a number on a number line.	MA 4.1.1.d Determine whether a given whole number up to 100 is a multiple of a given one-digit number.	MA 5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).
MA 0.1.1.e Count up to 20 objects arranged in a line, a rectangular array, or a circle. Count up to 10 objects in a scattered configuration. Count out the number of objects, given a number from 1 to 20.	MA 1.1.1.e Demonstrate that decade numbers represent a number of tens and 0 ones.	MA 2.1.1.e Compare two three-digit numbers by using symbols $<$, $=$, and $>$ and justify the comparison based on the meanings of the hundreds, tens, and ones.	MA 3.1.1.e Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.	MA 4.1.1.e Determine factors of any whole number up to 100.	MA 5.1.1.e Write powers of 10 with exponents.

MA 0.1.1.f Write numbers 0 to 20 and represent a number of objects with a written numeral 0 to 20.	MA 1.1.1.f Compare two two-digit numbers by using symbols $<$, $=$, and $>$ and justify the comparison based on the number of tens and ones.		MA 3.1.1.f Show and identify equivalent fractions using visual representations including pictures, manipulatives, and number lines.	MA 4.1.1.f Compare whole numbers up to one million and decimals through the hundredths place using $>$, $<$, and $=$ symbols, and visual representations.	
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MA K - 12.1 NUMBER: Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships
MA 0.1.1.g Compose and decompose numbers from 11 to 19 into ten ones and some more ones by a drawing, model, or equation (e.g., $14 = 10 + 4$) to record each composition and decomposition.			MA 3.1.1.g Find parts of a whole and parts of a set using visual representations.	MA 4.1.1.g Round a multi-digit whole number to any given place.	
MA 0.1.1.h Compare the number of objects in two groups by identifying the comparison as greater than, less than, or equal to by using strategies of matching and counting.			MA 3.1.1.h Explain and demonstrate how fractions $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and a whole relate to time, measurement, and money, and demonstrate using visual representation.	MA 4.1.1.h Use decimal notation for fractions with denominators of 10 or 100.	
MA 0.1.1.i Compare the value of two written numerals between 1 and 10.			MA 3.1.1.i Compare and order fractions having the same numerators or denominators using visual representations, comparison symbols, and verbal reasoning.	MA 4.1.1.i Generate and explain equivalent fractions by multiplying by an equivalent fraction of 1.	
				MA 4.1.1.j Explain how to change a mixed number to a fraction and how to change a fraction to a mixed number.	
				MA 4.1.1.k Compare and order fractions having unlike numerators and unlike denominators using visual representations (number line), comparison symbols and verbal reasoning, e.g., using benchmarks or common numerators or common denominators.	

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Numeric Relationships	Numeric Relationships				
				MA 4.1.1.I Decompose a fraction into a sum of fractions with the same denominator in more than one way and record each decomposition with an equation and a visual representation.	

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
<p>MA 0.1.2 Operations: Students will demonstrate the meaning of addition and subtraction with whole numbers and compute accurately.</p>	<p>MA 1.1.2 Operations: Students will demonstrate the meaning of addition and subtraction with whole numbers and compute accurately.</p>	<p>MA 2.1.2 Operations: Students will demonstrate the meaning of addition and subtraction with whole numbers and compute accurately.</p>	<p>MA 3.1.2 Operations: Students will demonstrate the meaning of multiplication and division with whole numbers and compute accurately.</p>	<p>MA 4.1.2 Operations: Students will demonstrate the meaning of addition and subtraction of fractions and compute accurately.</p>	<p>MA 5.1.2 Operations: Students will demonstrate the meaning of the operations with decimals and compute whole numbers by a fraction accurately.</p>
MA 0.1.2.a Fluently add and subtract within 5.	MA 1.1.2.a Fluently add and subtract within 10.	MA 2.1.2.a Fluently add and subtract within 20.	MA 3.1.2.a Add and subtract within 1,000 with or without regrouping.	MA 4.1.2.a Add and subtract multi-digit numbers using the standard algorithm.	MA 5.1.2.a Multiply multi-digit whole numbers using the standard algorithm.
	MA 1.1.2.b Add and subtract within 20, using a variety of strategies, e.g., count on to make a ten.	MA 2.1.2.b Add and subtract within 100 using strategies based on place value, including the standard algorithm, properties of operations, and/or the relationship between addition and subtraction.	MA 3.1.2.b Select and apply the appropriate methods of computation when solving one and two step addition and subtraction problems with four-digit whole numbers through the thousands (e.g., visual representations, mental computation, paper-pencil).	MA 4.1.2.b Multiply a four-digit whole number by a one-digit whole number.	MA 5.1.2.b Divide four-digit whole numbers by a two-digit divisor with or without remainders using the standard algorithm.
	MA 1.1.2.c Find the difference between two numbers that are multiples of 10, ranging from 10 – 90 using concrete models, drawings or strategies, and write the corresponding equation, e.g., $90 - 70 = 20$.	MA 2.1.2.c Mentally add or subtract 10 or 100 to/from a given number 100-900.	MA 3.1.2.c Use drawings, words, arrays, symbols, repeated addition, equal groups, and number lines to explain the meaning of multiplication.	MA 4.1.2.c Multiply a two-digit whole number by a two-digit whole number using the standard algorithm.	MA 5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
	MA 1.1.2.d Mentally find 10 more or 10 less than a two-digit number without having to count and explain the reasoning used, e.g., 33 is 10 less than 43.	MA 2.1.2.d Add up to three two-digit numbers using strategies based on place value and understanding of properties.	MA 3.1.2.d Use words and symbols to explain the meaning of the Zero Property and Identity Property of multiplication.	MA 4.1.2.d Divide up to a four-digit whole number by a one-digit divisor with and without a remainder.	MA 5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction.

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Operations	Operations	Operations	Operations	Operations	Operations
	MA 1.1.2.e Add within 100, which may include adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of ten using concrete models, drawings, and strategies which reflect understanding of place value.	MA 2.1.2.e Add and subtract within 1000, using concrete models, drawings, and strategies, which reflect understanding of place value and properties of operations.	MA 3.1.2.e Multiply one digit whole numbers by multiples of 10 in the range of 10 to 90.	MA 4.1.2.e Use drawings, words, and symbols to explain the meaning of addition and subtraction of fractions with like denominators.	MA 5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
		MA 2.1.2.f Use addition to find the total number of objects arranged in an array no larger than five rows and five columns and write an equation to express the total (e.g., $3+3+3=9$).	MA 3.1.2.f Use objects, drawings, arrays, words and symbols to explain the relationship between multiplication and division (e.g., if $3 \times 4 = 12$ then $12 \div 3 = 4$).	MA 4.1.2.f Add and subtract fractions and mixed numbers with like denominators.	MA 5.1.2.f Interpret a fraction as division of the numerator by the denominator.
			MA 3.1.2.g Fluently multiply and divide within 100.	MA 4.1.2.g Multiply a fraction by a whole number.	MA 5.1.2.g Add, subtract, multiply, and divide decimals to the hundredths using concrete models or drawings and strategies based on place value, properties of operations, and/or relationships between operations.
			MA 3.1.2.h Determine the reasonableness of whole number sums and differences in real-life problems using estimation, compatible numbers, mental computations, or other strategies.	MA 4.1.2.h Determine the reasonableness of whole number products and quotients in real-life problems using estimation, compatible numbers, mental computations, or other strategies.	MA 5.1.2.h Add and subtract fractions and mixed numbers with unlike denominators.
					MA 5.1.2.i Determine the reasonableness of computations involving whole numbers, fractions, and decimals.
					MA 5.1.2.j Multiply and divide by powers of 10.

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Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
<p>MA.6.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among fractions, decimals, percents, and integers within the base-ten number system</p>	<p>MA.7.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among rational numbers within the base-ten number system.</p>	<p>MA.8.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among real numbers within the base-ten number system.</p>	<p>MA.11.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among the subsets of real numbers and the complex number system.</p>	<p>MA.12.1.1 Numeric Relationships: Students will demonstrate, represent, and show relationships among the complex numbers.</p>
<p>MA 6.1.1.a Determine common factors and common multiples using prime factorization of numbers with and without exponents.</p>	<p>MA 7.1.1.a Convert a rational number to a decimal using long division.</p>	<p>MA 8.1.1.a Determine subsets of numbers as natural, whole, integer, rational, irrational, or real, based on the definitions of these sets of numbers.</p>	<p>MA 11.1.1.a Compare and contrast subsets of the complex number system, including imaginary, rational, irrational, integers, whole, and natural numbers.</p>	<p>MA 12.1.1.a (AT) Graph complex numbers on the complex plane.</p>
<p>MA 6.1.1.b Represent numbers using exponential notation.</p>		<p>MA 8.1.1.b Represent numbers using positive and negative exponents including scientific notation.</p>	<p>MA 11.1.1.b Use drawings, words, and symbols to explain the effects of operations such as multiplication and division on the magnitude of quantities in the real number system, including powers and roots, e.g. if you take the square root of a number, will the result always be smaller than the original number.</p>	<p>MA 12.1.1.b (AT) Determine the magnitude of complex numbers.</p>
<p>MA 6.1.1.c Compare and order rational numbers both on the number line and not on the number line.</p>		<p>MA 8.1.1.c Demonstrate the difference between a rational and irrational number.</p>		<p>MA 12.1.1.c (AT) Use matrices to represent and manipulate data.</p>

MA K - 12.1 NUMBER: Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships	Numeric Relationships
MA 6.1.1.d Convert among fractions, decimals, and percents using multiple representations.		MA 8.1.1.d Approximate, compare, and order real numbers, both on the number line and off the number line, including irrational number approximations.		MA 12.1.1.d (AT) Recognize the role that additive and multiplicative identities play in matrix operations.
MA 6.1.1.e Determine ratios from drawings, words, and manipulatives with the use of symbols.				MA 12.1.1.e (AT) Recognize that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
MA 6.1.1.f Convert unit rates.				
MA 6.1.1.g Model integers using drawings, words, manipulatives, number lines, and symbols.				
MA 6.1.1.h Compare and order integers and absolute value both on the number line and not on the number line.				
MA 6.1.1.i Determine absolute value of rational numbers.				

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Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
MA 6.1.2 Operations: Students will compute with fractions and decimals accurately.	MA 7.1.2 Operations: Students will compute with rational numbers accurately.	MA 8.1.2 Operations: Students will compute with exponents and roots.	MA 11.1.2 Operations: Students will compute with real and complex numbers.	MA 12.1.2 Operations: Students will compute with matrices.
MA 6.1.2.a Multiply and divide fractions and mixed numbers.	MA 7.1.2.a Solve problems using proportions and ratios (e.g., cross products, percents, tables, equations, and graphs).	MA 8.1.2.a Evaluate the square roots of small perfect squares and cube roots of small perfect cubes.	MA 11.1.2.a Compute with subsets of the complex number system, including imaginary, rational, irrational, integers, whole, and natural numbers.	MA 12.1.2.a (AT) Multiply matrices by scalars to produce new matrices.
MA 6.1.2.b Convert between metric and standard units of measurement.	MA 7.1.2.b Add, subtract, multiply, and divide rational numbers (e.g., positive and negative fractions, decimals, and integers).	MA 8.1.2.b Simplify numerical expressions involving exponents and roots, e.g., 4^{-2} is the same as $1/16$.	MA 11.1.2.b Simplify expressions with rational exponents.	MA 12.1.2.b (AT) Add, subtract, and multiply matrices of appropriate dimensions.
MA 6.1.2.c Evaluate expressions with positive exponents.	MA 7.1.2.c Apply properties of operations as strategies for problem solving with rational numbers.	MA 8.1.2.c Multiply and divide numbers using scientific notation.	MA 11.1.2.c Select, apply, and explain the method of computation when problem solving using real numbers (e.g., models, mental computation, paper-pencil, or technology).	
MA 6.1.2.d Divide multi-digit numbers using the standard algorithm.	MA 7.1.2.d Use multiple representations and strategies to add, subtract, multiply, and divide integers.	MA 8.1.2.d Estimate and check reasonableness of answers using appropriate strategies and tools.	MA 11.1.2.d Use estimation methods to check the reasonableness of real number computations and decide if the problem calls for an approximation (including appropriate rounding) or an exact number.	
MA 6.1.2.e Add, subtract, multiply, and divide decimals using the standard algorithm.	MA 7.1.2.e Estimate and check reasonableness of answers using appropriate strategies and tools.			

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Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
Operations	Operations	Operations	Operations	Operations
MA 6.1.2.f Estimate and check reasonableness of answers using appropriate strategies and tools.				

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MA K - 12.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
<p>MA 0.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations.</p>	<p>MA 1.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations.</p>	<p>MA 2.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations.</p>	<p>MA 3.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations.</p>	<p>MA 4.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations.</p>	<p>MA 5.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions and equations.</p>
<p>MA 0.2.1.a Decompose numbers less than or equal to 10 into pairs in more than one way, showing each decomposition with a model, drawing, or equation (e.g., $7 = 4 + 3$ and $7 = 1 + 6$).</p>	<p>MA 1.2.1.a Use the meaning of the equal sign to determine if equations are true and give examples of equations that are true (e.g., $4 = 4$, $6 = 7 - 1$, $6 + 3 = 3 + 6$, and $7 + 2 = 5 + 4$).</p>	<p>MA 2.2.1.a Identify a group of objects from 0-20 as even or odd by counting by 2's or by showing even numbers as a sum of two equal parts.</p>	<p>MA 3.2.1.a Identify arithmetic patterns (including patterns in the addition or multiplication tables) using properties of operations.</p>	<p>MA 4.2.1.a Create a simple algebraic expression or equation using a variable for an unknown number to represent a math process (e.g., $3 + n = 15$, $81 \div n = 9$).</p>	<p>MA 5.2.1.a Form ordered pairs from a rule such as $y=2x$, and graph the ordered pairs on a coordinate plane.</p>
<p>MA 0.2.1.b For any number from 1 to 9, find the number that makes 10 when added to the given number, showing the answer with a model, drawing, or equation.</p>	<p>MA 1.2.1.b Use the relationship of addition and subtraction to solve subtraction problems (e.g., find $12 - 9 = \underline{\quad}$, using the addition fact $9 + 3 = 12$).</p>		<p>MA 3.2.1.b Interpret a multiplication equation as equal groups (e.g., interpret 4×6 as the total number of objects in four groups of six objects each). Represent verbal statements of equal groups as multiplication equations.</p>	<p>MA 4.2.1.b Generate and analyze a number or shape pattern to follow a given rule; such as $y = 3x + 5$ is a rule to describe a relationship between two variables and can be used to find a second number when a first number is given.</p>	
	<p>MA 1.2.1.c Find numerical patterns to make connections between counting and addition and subtraction (e.g., adding two is the same as counting on two).</p>				
	<p>MA 1.2.1.d Determine the unknown whole number in an addition or subtraction equation, e.g. $7 + ? = 13$.</p>				

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
MA 0.2.2 Algebraic Processes: Students will apply the operational properties when adding and subtracting.	MA 1.2.2 Algebraic Processes: Students will apply the operational properties when adding and subtracting.	MA 2.2.2 Algebraic Processes: Students will apply the operational properties when adding and subtracting.	MA 3.2.2 Algebraic Processes: Student will apply the operational properties when multiplying and dividing.	MA 4.2.2 Algebraic Processes: Students will apply the operational properties when evaluating expressions and solving equations.	MA 5.2.2 Algebraic Processes: Students will apply the operational properties when evaluating expressions and solving equations.
Mastery is not expected at this level.	MA 1.2.2.a Decompose numbers and use the commutative and associative properties of addition to develop addition and subtraction strategies including (making 10's and counting on from the larger number) to add and subtract basic facts within 20 (e.g., decomposing to make 10, $7 + 5 = 7 + 3 + 2 = 10 + 2 = 12$; using the commutative property to count on $2 + 6 = 6 + 2$; and using the associative property to make 10, $5 + 3 + 7 = 5 + (3 + 7) = 5 + 10$).	Mastery is not expected at this level.	MA 3.2.2.a Apply the commutative, associative, and distributive properties as strategies to multiply and divide.	MA 4.2.2.a Solve one- and two-step equations which use any or all of the four basic operations and include the use of a letter to represent the unknown quantity.	MA 5.2.2.a Interpret and evaluate numerical or algebraic expressions using order of operations (excluding exponents).
			MA 3.2.2.b Solve one-step whole number equations using the four operations, which include the use of a letter to represent the unknown quantity.		

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
<p>MA 0.2.3 Applications: Students will solve real-life problems involving addition and subtraction.</p>	<p>MA 1.2.3 Applications: Students will solve real-life problems involving addition and subtraction.</p>	<p>MA 2.2.3 Applications: Students will solve real-life problems involving addition and subtraction.</p>	<p>MA 3.2.3 Applications: Students will solve real-life problems involving equations with whole numbers.</p>	<p>MA 4.2.3 Applications: Students will solve real-life problems involving equations with fractions.</p>	<p>MA 5.2.3 Applications: Students will solve real-life problems involving equations with fractions and mixed numbers.</p>
<p>MA 0.2.3.a Solve real-life problems that involve addition and subtraction within 10 (e.g., by using objects or drawings to represent the problem).</p>	<p>MA 1.2.3.a Solve real-life problems involving addition and subtraction within 20 in situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all parts of the addition or subtraction problem (e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem).</p>	<p>MA 2.2.3.a Solve real-life problems involving addition and subtraction within 100 in situations of addition and subtraction, including adding to, subtracting from, joining and separating, and comparing situations with unknowns in all positions using objects, models, drawings, verbal explanations, expressions and equations.</p>	<p>MA 3.2.3.a Solve real-life problems involving two-step equations comprised of whole numbers using the four operations.</p>	<p>MA 4.2.3.a Solve real-life problems involving multi-step equations comprised of whole numbers using the four operations, including interpreting remainders.</p>	<p>MA 5.2.3.a Solve real-life problems using equations involving fractions and mixed numbers using addition and subtraction.</p>
	<p>MA 1.2.3.b Solve real-life problems that include addition of three whole numbers whose sum is less than or equal to 20 by using objects, drawings, and equations with a symbol to represent the unknown number in the problem.</p>	<p>MA 2.2.3.b Create real-life problems to represent one-and two-step addition and subtraction within 100, with unknowns in all positions.</p>	<p>MA 3.2.3.b Write an equation (e.g., one operation, one variable) to represent real-life problems comprised of whole numbers.</p>	<p>MA 4.2.3.b Solve real-life problems involving addition and subtraction of fractions and mixed numbers with like denominators.</p>	<p>MA 5.2.3.b Solve real-life problems involving addition and subtraction of fractions and mixed numbers with unlike denominators.</p>
	<p>MA 1.2.3.c Create a real-life problem to represent a given equation involving addition and subtraction within 20.</p>				

MA K - 12.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9-11	Grade 12 Advanced Topics (AT)
MA 6.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions, equations, and inequalities.	MA 7.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions, equations, and inequalities.	MA 8.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with expressions, equations, and inequalities.	MA 11.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with functions.	MA 12.2.1 Algebraic Relationships: Students will demonstrate, represent, and show relationships with non-linear and trigonometric functions.
MA 6.2.1.a Create algebraic expressions (e.g., one operation, one variable as well as multiple operations, one variable) from word phrases.	MA 7.2.1.a Describe and create an inequality from words and pictures (e.g., one-step, one-variable).	MA 8.2.1.a Create algebraic expressions, equations, and inequalities (e.g., two-step, one variable) from word phrases, tables, and pictures.	MA 11.2.1.a Analyze a relation to determine if it is a function given graphs, tables, or algebraic notation.	MA 12.2.1.a (AT) Analyze and graph non-linear functions, e.g., quadratic, trigonometric, square root, logarithmic, rational, higher-order polynomials, absolute value, piecewise, and sinusoidal.
MA 6.2.1.b Recognize and generate equivalent algebraic expressions involving distributive property and combining like terms.	MA 7.2.1.b Represent proportional relationships by equations.	MA 8.2.1.b Determine and describe the rate of change for given situations, tables, and graphs.	MA 11.2.1.b Classify a function given graphs, tables, or algebraic notation.	MA 12.2.1.b (AT) Use the unit circle to define the trigonometric functions on all real numbers.
MA 6.2.1.c Analyze the relationship between dependent and independent variables using graphs, tables and equations.		MA 8.2.1.c Describe equations as having one solution, no solution, or infinitely many solutions.	MA 11.2.1.c Identify domain and range of functions represented in either algebraic or graphical form.	MA 12.2.1.c (AT) Use limits to describe the behavior of a function near its asymptotes and removable discontinuities.
		MA 8.2.1.d Graph proportional relationships, interpreting the unit rate as the slope.	MA 11.2.1.d Analyze and graph linear functions and inequalities (point-slope form, slope-intercept form, standard form, intercepts, rate of change, parallel and perpendicular lines, vertical and horizontal lines, and inequalities).	MA 12.2.1.d (AT) Understand that the radian measure of an angle is the length of the arc on the unit circle subtended by that angle.

MA K - 12.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9-11	Grade 12 Advanced Topics (AT)
Algebraic Relationships	Algebraic Relationships	Algebraic Relationships	Algebraic Relationships	Algebraic Relationships
			MA 11.2.1.e Analyze and graph absolute value functions (finding the vertex, symmetry, transformations, determine intercepts, and minimums or maximums).	
			MA 11.2.1.f Analyze and graph quadratic functions (standard form, vertex form, finding zeros, symmetry, transformations, determine intercepts, and minimums or maximums).	
			MA 11.2.1.g Represent, interpret, and analyze inverses of functions.	

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MA K - 12.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9-11	Grade 12 Advanced Topics (AT)
MA 6.2.2 Algebraic Processes: Students will apply the operational properties when evaluating expressions and solving expressions, equations, and inequalities.	MA 7.2.2 Algebraic Processes: Students will apply the operational properties when evaluating expressions and solving equations, and inequalities.	MA 8.2.2 Algebraic Processes: Students will apply the operational properties when evaluating expressions and solving expressions, equations, and inequalities.	MA 11.2.2 Algebraic Processes: Students will apply the operational properties when evaluating rational expressions, and solving linear and quadratic equations, and inequalities.	MA 12.2.2 Algebraic Processes: Students will apply the identities when evaluating and solving trigonometric equations.
MA 6.2.2.a Simplify expressions using the distributive property and combining like terms.	MA 7.2.2.a Solve equations using the distributive property and combining like terms.	MA 8.2.2.a Solve multi-step equations involving rational numbers with the same variable used on both sides.	MA 11.2.2.a Identify and explain the properties used in solving equations and inequalities.	MA 12.2.2.a (AT) Derive and use the formulas for the general term and summation of finite arithmetic and geometric series.
MA 6.2.2.b Use substitution to determine if a given value for a variable makes an equation or inequality true.	MA 7.2.2.b Use factoring and properties of operations to create equivalent algebraic expressions. [e.g., $2x + 6 = 2(x + 3)$].	MA 8.2.2.b Solve two-step inequalities involving rational numbers and represent solutions on a number line.	MA 11.2.2.b Simplify algebraic expressions involving integer and rational exponents.	MA 12.2.2.b (AT) Use trigonometric identities to solve trigonometric equations.
MA 6.2.2.c Evaluate numerical expressions, including absolute value and exponents, with respect to order of operations.	MA 7.2.2.c Given the value of the variable(s), evaluate algebraic expressions (including absolute value) with respect to order of operations (rational numbers).		MA 11.2.2.c Perform operations on rational expressions (add, subtract, multiply, divide, and simplify).	MA 12.2.2.c (AT) Explain symmetry (odd and even) and periodicity of trigonometric functions.
MA 6.2.2.d Given the value of the variable, evaluate algebraic expressions (which may include absolute value) with respect to order of operations (non-negative rational numbers).	MA 7.2.2.d Solve two-step equations involving integers and rational numbers.		MA 11.2.2.d Evaluate expressions at specified values of their variables (polynomial, rational, radical, and absolute value).	

MA K - 12.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9-11	Grade 12 Advanced Topics (AT)
Algebraic Processes	Algebraic Processes	Algebraic Processes	Algebraic Processes	Algebraic Processes
MA 6.2.2.e Solve one-step equations with non-negative rational numbers using addition, subtraction, multiplication and division.	MA 7.2.2.e Solve one-step and two-step inequalities involving rational numbers (including whole numbers, fractions and decimals) and represent solutions on a number line.		MA 11.2.2.e Solve an equation involving several variables for one variable in terms of the others.	
MA 6.2.2.f Make tables of equivalent ratios relating quantities with whole-numbers and find missing values in the tables, and plot the pairs of values on the coordinate plane.			MA 11.2.2.f Solve linear equations and inequalities including absolute value.	
MA 6.2.2.g Represent inequalities on a number line, e.g., graph $x > 3$.			MA 11.2.2.g Analyze and solve systems of two linear equations and inequalities in two variables algebraically and graphically.	
			MA 11.2.2.h Perform operations on polynomials (add, subtract, multiply, divide).	
			MA 11.2.2.i Factor polynomials.	
			MA 11.2.2.j Combine functions by composition and perform operations on functions (addition, subtraction, multiplication, division).	
			MA 11.2.2.k Solve quadratic equations involving real and imaginary values.	

MA K - 12.2 ALGEBRA: Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9-11	Grade 12 Advanced Topics (AT)
<p>MA 6.2.3 Applications: Students will solve real-life problems involving ratios, unit rates, and percents.</p>	<p>MA 7.2.3 Applications: Students will solve real-life problems involving inequalities.</p>	<p>MA 8.2.3 Applications: Students will solve real-life problems involving multi-step equations and multi-step inequalities.</p>	<p>MA 11.2.3 Applications: Students will solve real-life problems involving linear equations and inequalities, systems of linear equations, quadratic, exponential, square root, and absolute value functions.</p>	<p>MA 12.2.3 Applications: Students will solve real-life problems involving trigonometric functions.</p>
MA 6.2.3.a Write equations (e.g., one operation, one variable) to represent real-life problems comprised of non-negative rational numbers.	MA 7.2.3.a Describe and write equations from words and tables.	MA 8.2.3.a Describe and write equations from words, patterns, and tables.	MA 11.2.3.a Analyze, model, and solve real-life problems using various representations (graphs, tables, linear equations and inequalities, systems of linear equations, quadratic, exponential, square root, and absolute value functions).	MA 12.2.3.a (AT) Model periodic events with specified amplitude, frequency, and shifts.
MA 6.2.3.b Solve real-life problems comprised of non-negative rational numbers.	MA 7.2.3.b Write an equation to represent real-life problems comprised of rational numbers in any form (e.g., positive and negative fractions, decimals and integers).	MA 8.2.3.b Write an equation to represent real-life problems comprised of rational numbers in any form (whole numbers, fractions, and decimals).		MA 12.2.3.b (AT) Solve real-life problems using inverse trigonometric functions.
MA 6.2.3.c Solve real-life problems involving percents of numbers.	MA 7.2.3.c Solve real-life problems comprised of rational numbers in any form (e.g., positive and negative fractions, decimals and integers).	MA 8.2.3.c Solve real-life multi-step problems comprised of rational numbers in any form (whole numbers, fractions, and decimals).		
MA 6.2.3.d Solve real-life problems using ratios and unit rates.	MA 7.2.3.d Solve real-life problems comprised of inequalities.			
	MA 7.2.3.e Use proportional relationships to solve real-life problems, including percent problems, (e.g., % increase, % decrease, mark-up, tip).			

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grades 3	Grade 4	Grade 5
<p>MA 0.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.</p>	<p>MA 1.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.</p>	<p>MA 2.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.</p>	<p>MA 3.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.</p>	<p>MA 4.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.</p>	<p>MA 5.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.</p>
<p>MA 0.3.1.a Describe real-life objects using names of shapes, regardless of their orientation or size (squares, circle, triangles, rectangles, hexagons, cubes, cones, spheres, and cylinders).</p>	<p>MA 1.3.1.a Determine defining and non-defining attributes of two-dimensional shapes; build and draw shapes that match the given definition.</p>	<p>MA 2.3.1.a Recognize and draw shapes having a specific number of angles, faces, or other attributes.</p>	<p>MA 3.3.1.a Identify the number of sides, angles, and vertices of two-dimensional shapes.</p>	<p>MA 4.3.1.a Recognize angles as geometric shapes that are formed where two rays share a common endpoint.</p>	<p>MA 5.3.1.a Identify three-dimensional figures.</p>
<p>MA 0.3.1.b Identify shapes as two-dimensional ("flat") or three-dimensional ("solid").</p>	<p>MA 1.3.1.b Decompose circles and rectangles into two and four equal parts, using the terms halves, fourths and quarters, and use the phrases half of, fourths of, and quarter of.</p>	<p>MA 2.3.1.b Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.</p>	<p>MA 3.3.1.b Sort quadrilaterals into categories (e.g., rhombuses, squares, rectangles, and other).</p>	<p>MA 4.3.1.b Classify an angle as acute, obtuse, or right.</p>	<p>MA 5.3.1.b Identify faces, edges, and vertices of rectangular prisms.</p>
<p>MA 0.3.1.c Compare and analyze two- and three-dimensional shapes, with different sizes and orientations, to describe their similarities, differences, parts (e.g., number of vertices), and other attributes (e.g., sides of equal length).</p>	<p>MA 1.3.1.c Use two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) and three-dimensional shapes (cube, rectangular prism, cones, and cylinders) to compose and describe new shapes.</p>	<p>MA 2.3.1.c Partition a rectangle into rows and columns of equal sized squares. Count to find the total.</p>	<p>MA 3.3.1.c Draw lines to separate two-dimensional figures into equal areas, and express the area of each part as a unit fraction of the whole.</p>	<p>MA 4.3.1.c Identify and draw points, lines, line segments, rays, angles, parallel lines, perpendicular lines, and intersecting lines, and recognize them in two-dimensional figures.</p>	<p>MA 5.3.1.c Justify the classification of two-dimensional figures based on their properties.</p>

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grades 3	Grade 4	Grade 5
Characteristics	Characteristics	Characteristics	Characteristics	Characteristics	Characteristics
MA 0.3.1.d Model shapes found in real-life by building shapes from materials (e.g., clay and pipe cleaners) and drawing shapes.		MA 2.3.1.d Divide circles and rectangles into two, three, or four equal parts. Describe the parts using the language of halves, thirds, fourths, half of, a third of, a fourth of.		MA 4.3.1.d Classify two-dimensional shapes based on the presence or absence of parallel and perpendicular lines, or the presence or absence of specific angles.	
MA 0.3.1.e Combine simple shapes to compose larger shapes (e.g., use triangle pattern blocks to build a hexagon).		MA 2.3.1.e Recognize the equal shares of identical wholes need not have the same shape.		MA 4.3.1.e Identify right triangles.	
				MA 4.3.1.f Measure angles in whole number degrees using a protractor.	
				MA 4.3.1.g Sketch angles of a specified measure.	
				MA 4.3.1.h Recognize and draw lines of symmetry in two-dimensional shapes.	

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grades 3	Grade 4	Grade 5
MA 0.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 1.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 2.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 3.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 4.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 5.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.
MA 0.3.2.a Describe the relative positions of objects (e.g., above, below, beside, in front of, behind, next to, between).	Mastery is not expected at this level.	MA 5.3.2.a Identify the origin, x axis, and y axis of the coordinate plane.			
					MA 5.3.2.b Graph and name points in the first quadrant of the coordinate plane using ordered pairs of whole numbers.

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grades 3	Grade 4	Grade 5
MA 0.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 1.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 2.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 3.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 4.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 5.3.3 Measurement: Students will perform and compare measurements and apply formulas.
MA 0.3.3.a Describe measurable attributes of real-life objects, e.g., length or weight.	MA 1.3.3.a Identify, name, and understand the value of dimes and pennies (e.g., a dime is equal to ten pennies) relating to tens and ones, and solve real-life problems involving dimes and pennies, using ¢ symbol appropriately (e.g., If you have four dimes and two pennies, how many cents do you have?).	MA 2.3.3.a Solve real-life problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately.	MA 3.3.3.a Find the perimeter of polygons given the side lengths, and find an unknown side length.	MA 4.3.3.a Apply perimeter and area formulas for rectangles.	MA 5.3.3.a Recognize that solid figures have volume that is measured in cubic units.
MA 0.3.3.b Compare length and weight of two objects (e.g., longer/shorter, heavier/lighter).	MA 1.3.3.b Tell and write time to the half hour and hour using analog and digital clocks.	MA 2.3.3.b Identify and write time to five-minute intervals using analog and digital clocks and both a.m. and p.m.	MA 3.3.3.b Tell and write time to the minute using both analog and digital clocks.	MA 4.3.3.b Identify and use the appropriate tools, operations, and units of measurement, both customary and metric, to solve real-life problems involving time, length, weight, mass, capacity, and volume.	MA 5.3.3.b Use concrete and pictorial models to measure the volume of rectangular prisms in cubic units by counting cubic units.
	MA 1.3.3.c Measure objects by using a shorter object end-to-end and know that the length of the object is the amount of same-size objects that span it lined up end-to-end.	MA 2.3.3.c Identify and use appropriate tools for measuring length (e.g., ruler, yardstick, meter stick, and measuring tape).	MA 3.3.3.c Solve real-life problems involving addition and subtraction of time intervals in minutes.	MA 4.3.3.c Generate simple conversions from a larger unit to a smaller unit within a system of measurement.	MA 5.3.3.c Apply volume formulas for right rectangular prisms.

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grades 3	Grade 4	Grade 5
Measurement	Measurement	Measurement	Measurement	Measurement	Measurement
	MA 1.3.3.d Order three objects by directly comparing their lengths, or indirectly by using a third object.	MA 2.3.3.d Measure the length of an object using two different length units and describe how the measurements relate to the size of the specific unit.	MA 3.3.3.d Identify and use the appropriate tools and units of measurement, both customary and metric, to solve real-life problems involving length, weight, mass, liquid volume, and capacity (within the same system and unit).		MA 5.3.3.d Generate conversions within a system of measurement including smaller to larger units.
		MA 2.3.3.e Measure and estimate lengths using, inches, feet, centimeters, and meters.	MA 3.3.3.e Estimate and measure length to the nearest half inch, quarter inch, and centimeter.		
		MA 2.3.3.f Compare the difference in length of objects using, inches, feet, centimeters or meters.	MA 3.3.3.f Use concrete and pictorial models to measure areas in square units by counting square units.		
		MA 2.3.3.g Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, etc., and represent whole number sums and differences within 100 on a number line.	MA 3.3.3.g Find the area of a rectangle with whole-number side lengths by modeling with unit squares, and show that the area is the same as would be found by multiplying the side lengths.		
		MA 2.3.3.h Use measurement lengths and addition and subtraction within 100 to solve real-life problems.	MA 3.3.3.h Identify and draw rectangles with the same perimeter and different areas or with the same area and different perimeters.		

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
MA 6.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.	MA 7.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.	MA 8.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.	MA 11.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.	MA 12.3.1 Characteristics: Students will identify and describe geometric characteristics and create two- and three-dimensional shapes.
MA 6.3.1.a Identify and create nets to represent two-dimensional drawings of rectangular prisms and triangular prisms.	MA 7.3.1.a Apply and use properties of adjacent, complementary, supplementary, and vertical angles to find missing measures.	MA 8.3.1.a Determine and use the relationships of the interior angles of a triangle to find missing measures.	MA 11.3.1.a Know and use precise definitions based on the undefined terms of point, line, and plane, including ray, line segment, angle, perpendicular lines, parallel lines, and congruence.	MA 12.3.1.a (AT) Apply the Law of Sines and the Law of Cosines to find unknown measures in triangles.
	MA 7.3.1.b Draw triangles (freehand, with ruler and protractor, and using technology) with given conditions from three measures of angles or sides, and notice when the conditions determine a unique triangle, more than one triangle, or no triangle.	MA 8.3.1.b Identify and apply geometric properties of parallel lines cut by a transversal and the resulting corresponding, alternate interior, and alternate exterior angles to find missing measures.	MA 11.3.1.b Prove geometric theorems about angles, triangles, congruent triangles, similar triangles, parallel lines with transversals, and quadrilaterals using deductive reasoning.	MA 12.3.1.b (AT) Prove and apply properties of lengths of chords, secant segments, and tangent segments.
			MA 11.3.1.c Apply geometric properties to solve problems involving similar triangles, congruent triangles, quadrilaterals, and other polygons.	
			MA 11.3.1.d Identify and apply right triangle relationships including sine, cosine, tangent, special right triangles, and the converse of the Pythagorean Theorem.	

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
Characteristics	Characteristics	Characteristics	Characteristics	Characteristics
			MA 11.3.1.e Create geometric models to visualize, describe, and solve problems using similar triangles, right triangles, and trigonometry.	
			MA 11.3.1.f Know and use precise definitions and terminology of circles, including central angle, inscribed angle, arc, intercepted arc, chord, secant, and tangent.	
			MA 11.3.1.g Apply the properties of central angles, inscribed angles, angles formed by intersecting chords, and angles formed by secants and/or tangents to find the measures of angles related to the circle.	
			MA 11.3.1.h Sketch, draw, and construct appropriate representations of geometric objects using a variety of tools and methods which may include ruler/straight edge, protractor, compass, reflective devices, paper folding, or dynamic geometric software.	

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
MA 6.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 7.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 8.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 11.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.	MA 12.3.2 Analytic Geometry: Students will determine location, orientation, and relationships on the coordinate plane.
MA 6.3.2.a Identify the ordered pair of a given point in the coordinate plane.	MA 7.3.2.a Solve real-life problems involving scale drawings using a proportional relationship.	MA 8.3.2.a Perform and describe positions and orientation of shapes under single transformations including rotations (in multiples of 90 degrees about the origin), translations, reflections, and dilations on and off the coordinate plane.	MA 11.3.2.a Derive and apply the midpoint formula.	MA 12.3.2.a (AT) Recognize that vector quantities have both magnitude and direction and can be represented by directed line segments.
MA 6.3.2.b Plot the location of an ordered pair in the coordinate plane.		MA 8.3.2.b Find congruent two-dimensional figures and define congruence in terms of a series of transformations.	MA 11.3.2.b Use coordinate geometry to analyze linear relationships to determine if lines are parallel or perpendicular and to write the equations of parallel or perpendicular lines.	MA 12.3.2.b (AT) Add and subtract vectors graphically and algebraically.
MA 6.3.2.c Identify the quadrant of a given point in the coordinate plane.		MA 8.3.2.c Find similar two-dimensional figures and define similarity in terms of a series of transformations.	MA 11.3.2.c Derive and apply the distance formula.	MA 12.3.2.c (AT) Perform scalar multiplication of a vector and show it graphically.
MA 6.3.2.d Draw polygons in the coordinate plane given coordinates for the vertices.			MA 11.3.2.d Use coordinate geometry to prove triangles are right, acute, obtuse, isosceles, equilateral, or scalene.	MA 12.3.2.d (AT) Derive the equations of parabolas, ellipses, and hyperbolas.
MA 6.3.2.e Calculate vertical and horizontal distances in the coordinate plane to find perimeter and area.			MA 11.3.2.e Use coordinate geometry to prove quadrilaterals are trapezoids, isosceles trapezoids, parallelograms, rectangles, rhombi, kites, or squares.	MA 12.3.2.e (AT) Determine the three-dimensional object created by rotating a two-dimensional object about an axis.

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
Analytic Geometry	Analytic Geometry	Analytic Geometry	Analytic Geometry	Analytic Geometry
			MA 11.3.2.f Perform and describe positions and orientation of shapes under a single translation using algebraic notation on a coordinate plane.	MA 12.3.2.f (AT) Determine the shape of a two-dimensional cross-section of a three-dimensional object.
			MA 11.3.2.g Perform and describe positions and orientation of shapes under a rotation about the origin in multiples of 90 degrees using algebraic notation on a coordinate plane.	
			MA 11.3.2.h Perform and describe positions and orientation of shapes under a reflection across a line using algebraic notation on a coordinate plane.	
			MA 11.3.2.i Perform and describe positions and orientation of shapes under a single dilation on a coordinate plane.	
			MA 11.3.2.j Derive the equation of a circle given the radius and the center.	

MA K - 12.3 GEOMETRY: Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
MA 6.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 7.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 8.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 11.3.3 Measurement: Students will perform and compare measurements and apply formulas.	MA 12.3.3 Measurement: Students will perform and compare measurements and apply formulas.
MA 6.3.3.a Determine the area of quadrilaterals, including parallelograms and trapezoids, and triangles by composition and decomposition of polygons as well as application of formula.	MA 7.3.3.a Solve real-life problems involving perimeter and area of composite shapes made from triangles, quadrilaterals and polygons.	MA 8.3.3.a Show a justification of the Pythagorean Theorem.	MA 11.3.3.a Convert between various units of area and volume, such as square feet to square yards.	MA 12.3.3.a (AT) Use Cavalieri's Principle to determine the volume of a sphere and other solid figures.
MA 6.3.3.b Determine the surface area of rectangular prisms and triangular prisms using nets.	MA 7.3.3.b Solve real-life problems involving surface area and volume of composite shapes made from rectangular and triangular prisms.	MA 8.3.3.b Apply the Pythagorean Theorem to find missing side lengths and to solve real world problems.	MA 11.3.3.b Apply the effect of a scale factor to determine the length, area, and volume of similar two- and three-dimensional shapes and solids.	MA 12.3.3.b (AT) Determine the tolerance interval and percent of error in measurement.
MA 6.3.3.c Use concrete and pictorial models to measure the volume of right rectangular prisms.	MA 7.3.3.c Determine the area and circumference of circles both on and off the coordinate plane.	MA 8.3.3.c Find the distance between any two points on the coordinate plane using the Pythagorean Theorem.	MA 11.3.3.c Find arc length and area of sectors of a circle.	
MA 6.3.3.d Apply volume formulas for right rectangular prisms.		MA 8.3.3.d Determine the volume of cones, cylinders, and spheres, and solve real-world problems.	MA 11.3.3.d Determine surface area and volume of spheres, cones, pyramids, and prisms using formulas and appropriate units.	

MA K - 12.4 DATA: Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
MA 0.4.1 Representations: Students will create displays that represent the data.	MA 1.4.1 Representations: Students will create displays that represent the data.	MA 2.4.1 Representations: Students will create displays that represent the data.	MA 3.4.1 Representations: Students will create displays that represent the data.	MA 4.4.1 Representations: Students will create displays that represent the data.	MA 5.4.1 Representations: Students will create displays that represent the data.
Mastery is not expected at this level.	MA 1.4.1.a Organize and represent a data set with up to three categories.	MA 2.4.1.a Create and represent a data set using pictographs and bar graphs to represent a data set with up to four categories.	MA 3.4.1.a Create scaled pictographs and scaled bar graphs to represent a data set—including data collected through observations, surveys, and experiments—with several categories.	MA 4.4.1.a Represent data using line plots where the horizontal scale is marked off in appropriate units—whole numbers, halves, quarters, or eighths.	
		MA 2.4.1.b Create and represent a data set by making a line plot.	MA 3.4.1.b Represent data using line plots where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.		
MA 0.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 1.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 2.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 3.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 4.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 5.4.2 Analysis & Applications: Students will analyze data to address the situation.
MA 0.4.2.a Identify, sort, and classify objects by size, shape, color, and other attributes. Identify objects that do not belong to a particular group and explain the reasoning used.	MA 1.4.2.a Ask and answer questions about the total number of data points, how many in each category, and compare categories by identifying how many more or less are in a particular category.	MA 2.4.2.a Interpret data using bar graphs with up to four categories. Solve simple comparison problems using information from the graphs.	MA 3.4.2.a Solve problems and make simple statements about quantity differences (e.g., how many more and how many less) using information represented in pictographs and bar graphs.	MA 4.4.2.a Solve problems involving addition or subtraction of fractions using information presented in line plots.	MA 5.4.2.a Formulate questions that can be addressed with data and make predictions about the data. Use observations, surveys, and experiments to collect, represent, and interpret the data using tables and bar graphs.
MA 0.4.3 Probability: Students will interpret and apply concepts of probability.	MA 1.4.3 Probability: Students will interpret and apply concepts of probability.	MA 2.4.3 Probability: Students will interpret and apply concepts of probability.	MA 3.4.3 Probability: Students will interpret and apply concepts of probability.	MA 4.4.3 Probability: Students will interpret and apply concepts of probability.	MA 5.4.3 Probability: Students will interpret and apply concepts of probability.
Mastery is not expected at this level.	Mastery is not expected at this level.	Mastery is not expected at this level.	Mastery is not expected at this level.	Mastery is not expected at this level.	Mastery is not expected at this level.

MA K - 12.4 DATA: Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
MA 6.4.1 Representations: Students will create displays that represent the data.	MA 7.4.1 Representations: Students will create displays that represent the data.	MA 8.4.1 Representations: Students will create displays that represent the data.	MA 11.4.1 Representations: Students will create displays that represent the data.	MA 12.4.1 Representations: Students will create displays that represent the data.
MA 6.4.1.a Represent data using line plots (dot plots), box plots, and histograms.		MA 8.4.1.a Represent bivariate data (i.e., ordered pairs) using scatter plots.		
		MA 8.4.1.b Find the slope and y-intercept of the line of best fit using approximation.		
MA 6.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 7.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 8.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 11.4.2 Analysis & Applications: Students will analyze data to address the situation.	MA 12.4.2 Analysis & Applications: Students will analyze data to address the situation.
MA 6.4.2.a Use operations with fractions to solve problems using information presented in line plots.	MA 7.4.2.a Explain the difference between a population and a sample.	MA 8.4.2.a Make predictions using an approximate line of best fit.	MA 11.4.2.a Identify and compute measures of central tendency (mean, median, mode) when provided data both with and without technology.	
MA 6.4.2.b Compare and interpret data sets based upon their graphical representations (center, spread and shape).	MA 7.4.2.b Generate conclusions about a population based upon a random sample.		MA 11.4.2.b Explain how transformations of data affect measures of central tendency.	
MA 6.4.2.c Find and interpret the mean, median, mode, and range for a set of data.	MA 7.4.2.c Determine and critique biases in different data representations.		MA 11.4.2.c Compare data sets and formulate conclusions.	
MA 6.4.2.d Compare the mean, median, mode, and range from two sets of data.			MA 11.4.2.d Support conclusions with valid arguments.	
			MA 11.4.2.e Develop linear equations for linear models to predict unobserved outcomes using the regression line and correlation coefficient.	
			MA 11.4.2.f Describe the shape, identify any outliers, and determine the spread of a data set.	

MA K - 12.4 DATA: Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
Analysis & Applications	Analysis & Applications	Analysis & Applications	Analysis & Applications	Analysis & Applications
			MA 11.4.2.g Explain the impact of sampling methods, bias, and the phrasing of questions asked during data collection, and the conclusions that can rightfully be made.	
			MA 11.4.2.h Explain the differences between a randomized experiment and observational studies.	
			MA 11.4.2.i Using scatter plots, analyze patterns and describe relationships in paired data.	
			MA 11.4.2.j Recognize when arguments based on data confuse correlation with causation.	
			MA 11.4.2.k Interpret data represented by the normal distribution, formulate conclusions, and recognize that some data sets are not normally distributed.	

MA K - 12.4 DATA: Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

Grade 6	Grade 7	Grade 8	Grades 9 - 11	Grade 12 Advanced Topics (AT)
MA 6.4.3 Probability: Students will interpret and apply concepts of probability.	MA 7.4.3 Probability: Students will interpret and apply concepts of probability.	MA 8.4.3 Probability: Students will interpret and apply concepts of probability.	MA 11.4.3 Probability: Students will interpret and apply concepts of probability.	MA 12.4.3 Probability: Students will interpret and apply concepts of probability.
Mastery is not expected at this level.	MA 7.4.3.a Generate a list of possible outcomes for a simple event.		MA 11.4.3.a Construct sample spaces and probability distributions.	MA 12.4.3.a (AT) Calculate the expected value of a random variable and interpret it as the mean of a probability distribution.
	MA 7.4.3.b Describe the theoretical probability of an event using a fraction, percentage, decimal, or ratio.		MA 11.4.3.b Use the appropriate counting techniques to determine the probability of an event.	MA 12.4.3.b (AT) Determine possible outcomes of a decision by assigning probabilities to outcome values and finding expected values.
	MA 7.4.3.c Find theoretical probabilities for independent events.		MA 11.4.3.c Determine if events are mutually exclusive and calculate their probabilities in either case.	MA 12.4.3.c (AT) Evaluate and compare strategies on the basis of expected values.
	MA 7.4.3.d Perform simple experiments and express the degree of likelihood (possible, impossible, certain, more likely, equally likely, or less likely); write as fractions and percentages.			MA 12.4.3.d (AT) Analyze decisions and strategies using probability concepts, e.g., medical testing and product testing.
	MA 7.4.3.e Find experimental probability for independent events.			
	MA 7.4.3.f Compare and contrast theoretical and experimental probabilities.			
	MA 7.4.3.g Find the probability of dependent compound events.			
	MA 7.4.3.h Identify complementary events and calculate their probabilities.			