

**Number Sense and Operations (NSO)**

Kindergarten		Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8		Grades 9-12		
<b>MA.K.NSO.1</b> Develop an understanding for counting using objects in a set.	MA.K.NSO.1.1 Given a group of up to 20 objects, count the number of objects in that group and represent the number of objects with a written numeral. State the number of objects in a rearrangement of that group without recounting.	<b>MA.1.NSO.1</b> Extend counting sequences and understand the place value of two-digit numbers.	MA.1.NSO.1.1 Starting at a given number, count forward and backwards within 120 by ones. Skip count by 2s to 20 and by 5s to 100.	<b>MA.2.NSO.1</b> Understand the place value of three-digit numbers.	MA.2.NSO.1.1 Read and write numbers from 0 to 1,000 using standard form, expanded form and word form.	<b>MA.3.NSO.1</b> Understand the place value of four-digit numbers.	MA.3.NSO.1.1 Read and write numbers from 0 to 10,000 using standard form, expanded form and word form.	<b>MA.4.NSO.1</b> Understand place value for multi-digit numbers.	MA.4.NSO.1.1 Express how the value of a digit in a multi-digit whole number changes if the digit moves one place to the left or right.	<b>MA.5.NSO.1</b> Understand the place value of multi-digit numbers with decimals to the thousandths place.	MA.5.NSO.1.1 Express how the value of a digit in a multi-digit number with decimals to the thousandths changes if the digit moves one or more places to the left or right.	<b>MA.6.NSO.1</b> Extend knowledge of numbers to negative numbers and develop an understanding of absolute value.	MA.6.NSO.1.1 Extend previous understanding of numbers to define rational numbers. Plot, order and compare rational numbers.	<b>MA.7.NSO.1</b> Rewrite numbers in equivalent forms.	MA.7.NSO.1.1 Know and apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to whole-number exponents and rational number bases.	<b>MA.8.NSO.1</b> Solve problems involving rational numbers, including numbers in scientific notation, and extend the understanding of rational numbers to irrational numbers.	MA.8.NSO.1.1 Extend previous understanding of rational numbers within the real number system. Locate an approximate value of a numerical expression involving irrational numbers on a number line.	<b>MA.912.NSO.1</b> Generate equivalent expressions and perform operations with expressions involving exponents, radicals or logarithms.	MA.912.NSO.1.1 Extend previous understanding of the Laws of Exponents to include rational exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions involving rational exponents.	MA.912.NSO.1.2 Generate equivalent algebraic expressions using the properties of exponents.
	MA.K.NSO.1.2 Given a number from 0 to 20, count out that many objects.		MA.1.NSO.1.2 Read numbers from 0 to 100 in standard form, expanded form and word form. Write numbers from 0 to 100 using standard form and expanded form.		MA.2.NSO.1.2 Compose and decompose three-digit numbers in multiple ways using hundreds, tens and ones. Demonstrate each composition or decomposition with objects, drawings and expressions or equations.		MA.3.NSO.1.2 Compose and decompose four-digit numbers in multiple ways using thousands, hundreds, tens and ones. Demonstrate each composition or decomposition using objects, drawings and expressions or equations.		MA.4.NSO.1.2 Read and write multi-digit whole numbers from 0 to 1,000,000 using standard form, expanded form and word form.		MA.5.NSO.1.2 Read and write multi-digit numbers with decimals to the thousandths using standard form, word form and expanded form.		MA.6.NSO.1.2 Given a mathematical or real-world context, represent quantities that have opposite direction using rational numbers. Compare them on a number line and explain the meaning of zero within its context.		MA.7.NSO.1.2 Rewrite rational numbers in different but equivalent forms including fractions, mixed numbers, repeating decimals and percentages to solve mathematical and real-world problems.		MA.8.NSO.1.2 Plot, order and compare rational and irrational numbers, represented in various forms.		MA.912.NSO.1.3 Generate equivalent algebraic expressions involving radicals or rational exponents using the properties of exponents.	
	MA.K.NSO.1.3 Identify positions of objects within a sequence using the words "first," "second," "third," "fourth" or "fifth."		MA.1.NSO.1.3 Compose and decompose two-digit numbers in multiple ways using tens and ones. Demonstrate each composition or decomposition with objects, drawings and expressions or equations.		MA.2.NSO.1.3 Plot, order and compare whole numbers up to 1,000.		MA.3.NSO.1.3 Plot, order and compare whole numbers up to 10,000.		MA.4.NSO.1.3 Plot, order and compare multi-digit whole numbers up to 1,000,000.		MA.5.NSO.1.3 Compose and decompose multi-digit numbers with decimals to the thousandths in multiple ways using the values of the digits in each place. Demonstrate the compositions or decompositions using objects, drawings and expressions or equations.		MA.6.NSO.1.3 Given a mathematical or real-world context, interpret the absolute value of a number as the distance from zero on a number line. Find the absolute value of rational numbers.		MA.8.NSO.1.3 Extend previous understanding of the Laws of Exponents to include integer exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to integer exponents and rational number bases, with procedural fluency.		MA.912.NSO.1.4 Apply previous understanding of operations with rational numbers to add, subtract, multiply and divide numerical radicals.			
	MA.K.NSO.1.4 Compare the number of objects from 0 to 20 in two groups using the terms less than, equal to or greater than.		MA.1.NSO.1.4 Plot, order and compare whole numbers up to 100.		MA.2.NSO.1.4 Round whole numbers from 0 to 100 to the nearest 10.		MA.3.NSO.1.4 Round whole numbers from 0 to 1,000 to the nearest 10 or 100.		MA.4.NSO.1.4 Round whole numbers from 0 to 10,000 to the nearest 10, 100 or 1,000.		MA.5.NSO.1.4 Plot, order and compare multi-digit numbers with decimals up to the thousandths.		MA.6.NSO.1.4 Solve mathematical and real-world problems involving absolute value, including the comparison of absolute value.		MA.8.NSO.1.4 Express numbers in scientific notation to represent and approximate very large or very small quantities. Determine how many times larger or smaller one number is compared to a second number.		MA.912.NSO.1.5 Add, subtract, multiply and divide algebraic expressions involving radicals.			
								MA.4.NSO.1.5 Plot, order and compare decimals up to the hundredths.		MA.5.NSO.1.5 Round multi-digit numbers with decimals to the thousandths to the nearest hundredth, tenth or whole number.			MA.8.NSO.1.5 Add, subtract, multiply and divide numbers expressed in scientific notation with procedural fluency.			MA.912.NSO.1.6 Given a numerical logarithmic expression, evaluate and generate equivalent numerical expressions using the properties of logarithms or exponents.				
													MA.8.NSO.1.6 Solve real-world problems involving operations with numbers expressed in scientific notation.			MA.912.NSO.1.7 Given an algebraic logarithmic expression, generate an equivalent algebraic expression using the properties of logarithms or exponents.				
													MA.8.NSO.1.7 Solve multi-step mathematical and real-world problems involving the order of operations with rational numbers including exponents and radicals.							

<p><b>MA.K.NSO.2</b> Recite number names sequentially within 100 and develop an understanding for place value.</p>	<p>MA.K.NSO.2.1 Recite the number names to 100 by ones and by tens. Starting at a given number, count forward within 100 and backward within 20.</p> <p>MA.K.NSO.2.2 Represent whole numbers from 10 to 20, using a unit of ten and a group of ones, with objects, drawings and expressions or equations.</p> <p>MA.K.NSO.2.3 Locate, order and compare numbers from 0 to 20 using the number line and terms less than, equal to or greater than.</p>	<p><b>MA.1.NSO.2</b> Develop an understanding of addition and subtraction operations with one- and two-digit numbers.</p>	<p>MA.1.NSO.2.1 Recall addition facts with sums to 10 and related subtraction facts with automaticity.</p> <p>MA.1.NSO.2.2 Add two whole numbers with sums from 0 to 20, and subtract using related facts with procedural reliability.</p> <p>MA.1.NSO.2.3 Identify the number that is one more, one less, ten more and ten less than a given two-digit number.</p> <p>MA.1.NSO.2.4 Explore the addition of a two-digit number and a one-digit number with sums to 100.</p> <p>MA.1.NSO.2.5 Explore subtraction of a one-digit number from a two-digit number.</p>	<p><b>MA.2.NSO.2</b> Add and subtract two- and three-digit whole numbers.</p>	<p>MA.2.NSO.2.1 Recall addition facts with sums to 20 and related subtraction facts with automaticity.</p> <p>MA.2.NSO.2.2 Identify the number that is ten more, ten less, one hundred more and one hundred less than a given three-digit number.</p> <p>MA.2.NSO.2.3 Add two whole numbers with sums up to 100 with procedural reliability. Subtract a whole number from a whole number, each no larger than 100, with procedural reliability.</p> <p>MA.2.NSO.2.4 Explore the addition of two whole numbers with sums up to 1,000. Explore the subtraction of a whole number from a whole number, each no larger than 1,000.</p>	<p><b>MA.3.NSO.2</b> Add and subtract multi-digit whole numbers. Build an understanding of multiplication and division operations.</p>	<p>MA.3.NSO.2.1 Add and subtract multi-digit whole numbers including using a standard algorithm with procedural fluency.</p> <p>MA.3.NSO.2.2 Explore multiplication of two whole numbers with products from 0 to 144, and related division facts.</p> <p>MA.3.NSO.2.3 Multiply a one-digit whole number by a multiple of 10, up to 90, or a multiple of 100, up to 900, with procedural reliability.</p> <p>MA.3.NSO.2.4 Multiply two whole numbers from 0 to 12 and divide using related facts with procedural reliability.</p>	<p><b>MA.4.NSO.2</b> Build an understanding of operations with multi-digit numbers including decimals.</p>	<p>MA.4.NSO.2.1 Recall multiplication facts with factors up to 12 and related division facts with automaticity.</p> <p>MA.4.NSO.2.2 Multiply two whole numbers, up to three digits by up to two digits, with procedural reliability.</p> <p>MA.4.NSO.2.3 Multiply two whole numbers, each up to two digits, including using a standard algorithm with procedural fluency.</p> <p>MA.4.NSO.2.4 Divide a whole number up to four digits by a one-digit whole number with procedural reliability. Represent remainders as fractional parts of the divisor.</p> <p>MA.4.NSO.2.5 Explore the multiplication and division of multi-digit whole numbers using estimation, rounding and place value.</p> <p>MA.4.NSO.2.6 Identify the number that is one-tenth more, one-tenth less, one-hundredth more and one-hundredth less than a given number.</p> <p>MA.4.NSO.2.7 Explore the addition and subtraction of multi-digit numbers with decimals to the hundredths.</p>	<p><b>MA.5.NSO.2</b> Add, subtract, multiply and divide multi-digit numbers.</p>	<p>MA.5.NSO.2.1 Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.</p> <p>MA.5.NSO.2.2 Divide multi-digit whole numbers, up to five digits by two digits, including using a standard algorithm with procedural fluency. Represent remainders as fractions.</p> <p>MA.5.NSO.2.3 Add and subtract multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.</p> <p>MA.5.NSO.2.4 Explore the multiplication and division of multi-digit numbers with decimals to the hundredths using estimation, rounding and place value.</p> <p>MA.5.NSO.2.5 Multiply and divide a multi-digit number with decimals to the tenths by one-tenth and one-hundredth with procedural reliability.</p>	<p><b>MA.6.NSO.2</b> Add, subtract, multiply and divide positive rational numbers.</p>	<p>MA.6.NSO.2.1 Multiply and divide positive multi-digit numbers with decimals to the thousandths, including using a standard algorithm with procedural fluency.</p> <p>MA.6.NSO.2.2 Extend previous understanding of multiplication and division to compute products and quotients of positive fractions by positive fractions, including mixed numbers.</p> <p>MA.6.NSO.2.3 Solve multi-step real-world problems involving any of the four operations with positive multi-digit decimals or positive fractions, including mixed numbers.</p>	<p><b>MA.7.NSO.2</b> Add, subtract, multiply and divide rational numbers.</p>	<p>MA.7.NSO.2.1 Solve mathematical problems using multi-step order of operations with rational numbers including grouping symbols, whole number exponents and absolute value.</p> <p>MA.7.NSO.2.2 Add, subtract, multiply and divide rational numbers with procedural fluency.</p> <p>MA.7.NSO.2.3 Solve real-world problems involving any of the four operations with rational numbers.</p>	<p>MA.912.NSO.2.1 Extend previous understanding of the real number system to include the complex number system. Add, subtract, multiply and divide complex numbers.</p> <p>MA.912.NSO.2.2 Represent addition, subtraction, multiplication and conjugation of complex numbers geometrically on the complex plane.</p> <p>MA.912.NSO.2.3 Calculate the distance and midpoint between two numbers on the complex coordinate plane.</p> <p>MA.912.NSO.2.4 Solve mathematical and real-world problems involving complex numbers represented algebraically or on the coordinate plane.</p> <p>MA.912.NSO.2.5 Represent complex numbers on the complex plane in rectangular and polar forms.</p> <p>MA.912.NSO.2.6 Rewrite complex numbers to trigonometric form. Multiply complex numbers in trigonometric form.</p>
<p><b>MA.K.NSO.3</b> Develop an understanding of addition and subtraction operations with one-digit whole numbers.</p>	<p>MA.K.NSO.3.1 Explore addition of two whole numbers from 0 to 10, and related subtraction facts.</p> <p>MA.K.NSO.3.2 Add two one-digit whole numbers with sums from 0 to 10 and subtract using related facts with procedural reliability.</p>								<p><b>MA.6.NSO.3</b> Apply properties of operations to rewrite numbers in equivalent forms.</p>	<p>MA.6.NSO.3.1 Given a mathematical or real-world context, find the greatest common factor and least common multiple of two whole numbers.</p> <p>MA.6.NSO.3.2 Rewrite the sum of two composite whole numbers having a common factor, as a common factor multiplied by the sum of two whole numbers.</p> <p>MA.6.NSO.3.3 Evaluate positive rational numbers with natural number exponents.</p> <p>MA.6.NSO.3.4 Express composite whole numbers as a product of prime factors with natural number exponents.</p> <p>MA.6.NSO.3.5 Rewrite positive rational numbers in different but equivalent forms including fractions, terminating decimals and percentages.</p>	<p><b>MA.912.NSO.3</b> Represent and perform operations with vectors.</p>	<p>MA.912.NSO.3.1 Apply appropriate notation and symbols to represent vectors in the plane as directed line segments. Determine the magnitude and direction of a vector in component form.</p> <p>MA.912.NSO.3.2 Represent vectors in component form, linear form or trigonometric form. Rewrite vectors from one form to another.</p> <p>MA.912.NSO.3.3 Solve mathematical and real-world problems involving velocity and other quantities that can be represented by vectors.</p> <p>MA.912.NSO.3.4 Solve mathematical and real-world problems involving vectors in two-dimensions using the dot product and vector projections.</p> <p>MA.912.NSO.3.5 Solve mathematical and real-world problems involving vectors in three-dimensions using the dot product and cross product.</p> <p>MA.912.NSO.3.6 Multiply a vector by a scalar algebraically or graphically.</p> <p>MA.912.NSO.3.7 Compute the magnitude and direction of a vector scalar multiple.</p> <p>MA.912.NSO.3.8 Add and subtract vectors algebraically or graphically.</p> <p>MA.912.NSO.3.9 Given the magnitude and direction of two or more vectors, determine the magnitude and direction of their sum.</p>				

**MA.6.NSO.4**

Extend understanding of operations with integers.

**MA.6.NSO.4.1**

Apply and extend previous understandings of operations with whole numbers to add and subtract integers with procedural fluency.

**MA.6.NSO.4.2**

Apply and extend previous understandings of operations with whole numbers to multiply and divide integers with procedural fluency.

**MA.912.NSO.4**

Represent and perform operations with matrices.

**MA.912.NSO.4.1**

Given a mathematical or real-world context, represent and manipulate data using matrices.

**MA.912.NSO.4.2**

Given a mathematical or real-world context, represent and solve a system of two- or three-variable linear equations using matrices.

**MA.912.NSO.4.3**

Solve mathematical and real-world problems involving addition, subtraction and multiplication of matrices.

**MA.912.NSO.4.4**

Solve mathematical and real-world problems using the inverse and determinant of matrices.

Fractions (FR)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grades 9-12
	<p><b>MA.1.FR.1</b> Develop an understanding of fractions by partitioning shapes into halves and fourths.</p>	<p><b>MA.1.FR.1.1</b> Partition circles and rectangles into two and four equal-sized parts. Name the parts of the whole using appropriate language including halves or fourths.</p>	<p><b>MA.2.FR.1</b> Develop an understanding of fractions.</p> <p><b>MA.2.FR.1.1</b> Partition circles and rectangles into two, three or four equal-sized parts. Name the parts using appropriate language, and describe the whole as two halves, three thirds or four fourths.</p> <p><b>MA.2.FR.1.2</b> Partition rectangles into two, three or four equal-sized parts in two different ways showing that equal-sized parts of the same whole may have different shapes.</p>	<p><b>MA.3.FR.1</b> Understand fractions as numbers and represent fractions.</p> <p><b>MA.3.FR.1.1</b> Represent and interpret unit fractions in the form <math>\frac{1}{n}</math> as the quantity formed by one part when a whole is partitioned into <math>n</math> equal parts.</p> <p><b>MA.3.FR.1.2</b> Represent and interpret fractions, including fractions greater than one, in the form of <math>\frac{m}{n}</math> as multiples of a unit fraction.</p> <p><b>MA.3.FR.1.3</b> Read and write fractions, including fractions greater than one, using standard form, numeral-word form and word form.</p>	<p><b>MA.4.FR.1</b> Develop an understanding of the relationship between different fractions and the relationship between fractions and decimals.</p> <p><b>MA.4.FR.1.1</b> Model and express a fraction, including mixed numbers and fractions greater than one, with the denominator 10 as an equivalent fraction with the denominator 100.</p> <p><b>MA.4.FR.1.2</b> Use decimal notation to represent fractions with denominators of 10 or 100, including mixed numbers and fractions greater than 1, and use fractional notation with denominators of 10 or 100 to represent decimals.</p> <p><b>MA.4.FR.1.3</b> Identify and generate equivalent fractions, including fractions greater than one. Describe how the numerator and denominator are affected when the equivalent fraction is created.</p> <p><b>MA.4.FR.1.4</b> Plot, order and compare fractions, including mixed numbers and fractions greater than one, with different numerators and different denominators.</p>	<p><b>MA.5.FR.1</b> Interpret a fraction as an answer to a division problem.</p> <p><b>MA.5.FR.1.1</b> Given a mathematical or real-world problem, represent the division of two whole numbers as a fraction.</p>			
			<p><b>MA.3.FR.2</b> Order and compare fractions and identify equivalent fractions.</p>	<p><b>MA.4.FR.2</b> Build a foundation of addition, subtraction and multiplication operations with</p>	<p><b>MA.5.FR.2</b> Perform operations with fractions.</p>				
			<p><b>MA.3.FR.2.1</b> Plot, order and compare fractional numbers with the same numerator or the same denominator.</p> <p><b>MA.3.FR.2.2</b> Identify equivalent fractions and explain why they are equivalent.</p>	<p><b>MA.4.FR.2.1</b> Decompose a fraction, including mixed numbers and fractions greater than one, into a sum of fractions with the same denominator in multiple ways. Demonstrate each decomposition with objects, drawings and equations.</p> <p><b>MA.4.FR.2.2</b> Add and subtract fractions with like denominators, including mixed numbers and fractions greater than one, with procedural reliability.</p> <p><b>MA.4.FR.2.3</b> Explore the addition of a fraction with denominator of 10 to a fraction with denominator of 100 using equivalent fractions.</p> <p><b>MA.4.FR.2.4</b> Extend previous understanding of multiplication to explore the multiplication of a fraction by a whole number or a whole number by a fraction.</p>	<p><b>MA.5.FR.2.1</b> Add and subtract fractions with unlike denominators, including mixed numbers and fractions greater than 1, with procedural reliability.</p> <p><b>MA.5.FR.2.2</b> Extend previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than 1, with procedural reliability.</p> <p><b>MA.5.FR.2.3</b> When multiplying a given number by a fraction less than 1 or a fraction greater than 1, predict and explain the relative size of the product to the given number without calculating.</p> <p><b>MA.5.FR.2.4</b> Extend previous understanding of division to explore the division of a unit fraction by a whole number and a whole number by a unit fraction.</p>				