MATHEMATICS VERTICAL ARTICULATION TOOL (MVAT)
2016 *Mathematics Standards of Learning* – Number and Number Sense
Kindergarten – Algebra II Progression

All K-8 Mathematics SOL for the Number and Number Sense strand are represented in this document. Not all End-of-Course Mathematics SOL are represented.

KEY TO COLORED BOXES: **ES** = K-5 Prior Knowledge Concepts; **MS** = 6-8 Prior Knowledge Concepts; **HS** = 9-12 Prior Knowledge Concepts; N/A = No Concepts Listed

Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	Number Identification and Representation
K.1a										tell how many are in a given set of 20 or fewer objects by counting orally
K.1b										read, write, and represent numbers from 0 through 20
K.3a										count forward orally by ones from 0 to 100
K.3b										count backward orally by ones when given any number between 1 and 10
K.3c										identify the number after, without counting, when given any number between 0 and 100 and identify the number before, without counting, when given any number between 1 and 10
K.3d										count forward by tens to determine the total number of objects to 100
K.4a										recognize and describe with fluency part-whole relationships for numbers up to 5
K.4b										investigate and describe part-whole relationships for numbers up to 10
	1.1a									count forward orally by ones to 110, starting at any number between 0 and 110
	1.1b									write the numerals 0 to 110 in sequence and out-of-sequence
	1.1c									count backward orally by ones when given any number between 1 and 30
	1.1d									count forward orally by ones, twos, fives, and tens to determine the total number of objects in 110
	1.2a									given up to 110 objects, will group a collection into tens and ones and write the corresponding numeral

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	Number Identification and Representation
	1.3									given an ordered set of ten objects and/or pictures, will indicate the ordinal position of each object, first through tenth
	1.5a									given a familiar problem situation involving magnitude, will select a reasonable order of magnitude from three given quantities: a one-digit numeral, a two-digit numeral, and a three-digit numeral (e.g., 5, 50, 500);
	1.5b									given a familiar problem situation involving magnitude, will explain the reasonableness of the choice
		2.1a								read, write, and identify the place and value of each digit in a three-digit numeral, with and without models
		2.1b								identify the number that is 10 more, 10 less, 100 more, and 100 less than a given number up to 999
		2.2a								count forward by twos, fives, and tens to 120, starting at various multiples of 2, 5 or 10
		2.2b								count backward by tens from 120
		2.3a								count and identify the ordinal positions first through twentieth, using an ordered set of objects
		2.3b								write the ordinal numbers 1st through 20th
			3.1a							read, write, and identify the place and value of each digit in a six-digit whole number, with and without models
				4.1a						read, write, and identify the place and value of each digit in a nine-digit whole number

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	**Whole Number and Decimal Rounding**
		2.1d								round two-digit numbers to the nearest ten
			3.1b							round whole numbers, 9,999 or less, to the nearest ten, hundred, and thousand
				4.1c						round whole numbers expressed through millions to the nearest thousand, ten thousand, and hundred thousand
				4.3b						round decimals to the nearest whole number
					5.1					given a decimal through thousandths, will round to the nearest whole number, tenth, or hundredth

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	**Rational Numbers - Compare and Order**
K.2a										given no more than three sets, each set containing 10 or fewer concrete objects, will compare and describe one set as having more, fewer, or the same number of objects as other sets
K.2b										given no more than three sets, each set containing 10 or fewer concrete objects, will compare and order sets from least to greatest
	1.2b									compare two numbers between 0 and 100 represented pictorially or with concrete objects, using the words *greater than*, *less than* or *equal to*
	1.2c									order three or fewer sets from least to greatest and greatest to least
		2.1c								compare and order whole numbers between 0 and 999
		2.4c								compare the unit fractions for halves, fourths, eighths, thirds, and sixths, with models
			3.1c							compare and order whole numbers, each 9,999 or less
			3.2c							compare fractions having like and unlike denominators, using words and symbols (<, >, =, or ≠), with models
				4.1b						compare and order whole numbers expressed through millions
				4.2a						compare and order fractions and mixed numbers, with and without models*
				4.3c						compare and order decimals
					5.2b					compare and order fractions, mixed numbers, and/or decimals, in a given set, from least to greatest and greatest to least*
						6.2b				compare and order positive rational numbers*
						6.3b				order and compare integers

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	Rational Numbers - Compare and Order
							7.1b			compare and numbers greater than zero written in scientific notation*
							7.1c			compare and order rational numbers*
								8.1		compare and order real numbers

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K-8 and Geometry Cross-Strand Connections – Rational Number - Compare and Order

Computation and Estimation Connections

Measurement and Geometry Connections

G.5 The student, given information concerning the lengths of sides and/or measures of angles in triangles, will solve problems, including practical problems. This will include
a) ordering the sides by length, given angle measures;
b) ordering the angles by degree measure, given side lengths;

Probability and Statistics Connections

Patterns, Functions, and Algebra Connections

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	Rational Number Equivalencies
K.5										investigate fractions by solving practical problems involving equal sharing with two sharers
	1.4a									represent and solve practical problems involving equal sharing with two or four sharers
	1.4b									represent and name fractions for halves and fourths, using models
		2.4a								name and write fractions represented by a set, region, or length model for halves, eighths, thirds and sixths
		2.4b								represent fractional parts with models and with symbols
			3.2a							name and write fractions and mixed numbers represented by a model
			3.2b							represent fractions and mixed numbers, with models and symbols
				4.2b						represent equivalent fractions*
				4.2c						identify the division statement that represents a fraction, with models and in context
				4.3a						read, write, represent, and identify decimals expressed through thousandths
				4.3d						given a model, write the decimal and fraction equivalents*
					5.2a					represent and identify equivalencies among fractions and decimals, with and without models*

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	Rational Number Equivalencies
						6.1				represent relationships between quantities using ratios, and will use appropriate notations, such as $\frac{a}{b}$, *a* to *b*, and *a*:*b*
						6.2a				represent and determine equivalencies among fractions, mixed numbers, decimals and percents*

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K-8 Cross-Strand Connections – Rational Number Equivalencies

Computation and Estimation Connections

Measurement and Geometry Connections

3.9 The student will
c) identify equivalent periods of time and solve practical problems related to equivalent periods of time.

4.8 The student will
c) given the equivalent measure of one unit, identify equivalent measures of length, weight/mass, and liquid volume between units within the U.S. Customary system; and

5.9 The student will
a) given the equivalent measure of one unit, identify equivalent measurements within the metric system;

Probability and Statistics Connections

Patterns, Functions, and Algebra

1.15 The student will demonstrate an understanding of equality through the use of the equal symbol.
2.17 The student will demonstrate an understanding of equality through the use of the equal symbol and the use of the not equal symbol.
3.17 The student will create equations to represent equivalent mathematical relationships
4.16 The student will recognize and demonstrate the meaning of equality in an equation.

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	Related to Algebra 11	Number Sets and Characteristics
		2.2c									use objects to determine whether a number is even or odd
					5.3a						identify and describe the characteristics of prime and composite numbers
					5.3b						identify and describe the characteristics of even and odd numbers
						6.3a					identify and represent integers
						6.3c					identify and describe absolute value of integers
							7.1e				identify and describe absolute value of rational numbers
								8.2			describe the relationships between the subsets of the real number system

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K-8 and Algebra I Cross-Strand Connections – Number Sets and Characteristics

Computation and Estimation Connections

Measurement and Geometry Connections

Probability and Statistics Connections

Patterns, Functions, and Algebra Connections

A.7 The student will investigate and analyze linear and quadratic function families and their characteristics both algebraically and graphically, including b) domain and range;

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Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Related to Algebra I	Related to Algebra II	**Exponents/Squares/Square Roots**
						6.4					recognize and represent patterns with whole number exponents and perfect squares
							7.1a				investigate and describe the concept of negative exponents for powers of ten
							7.1d				determine square root of perfect squares*
								8.3a			estimate and determine the two consecutive integers between which a square root lies
								8.3b			determine both the positive and negative square roots of a given perfect square
									A.3b		simplify the cube roots of integers
									A.3c		simplify numerical expressions containing square or cube roots

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K-8 and Geometry Cross-Strand Connections – Exponents/Squares/Square Roots

Computation and Estimation Connections

Measurement and Geometry Connections

8.9 The student will
a) verify the Pythagorean Theorem; and
b) apply the Pythagorean Theorem.

G.8 The student will solve problems, including practical problems, involving right triangles. This will include applying a) the Pythagorean Theorem and its converse

Probability and Statistics Connections

Patterns, Functions, and Algebra Connections

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