Standard	Benchmark	KSMS Knowledge Base Indicator		KSMS Application Indicator	
1--NUMBERS & COMPUTATION					
	1--Number Sense				
		1.1.1K. Knows , explains, and uses equivalent representations for rational numbers and simple algebraic expressions including integers, fractions, decimals, percents and ratios; integer bases with whole number bases with whole number exponents; positive rational numbers written in scientific notation with positive integer exponents; time; and money (2.4.K1a) $.		1.1.1A Generates and/or solves real world problems using (2.4.A1a) :	
				a. integers;	
				b. fractions greater than or equal to zero ;	
				c. decimals greater than or equal to zero through ten thousandths place (2.4.1a) $.	
		1.1.2K. Compares and orders (2.4.K1a): ▲		1.1.2A. Determines whether or not solutions to real-world problems that involve the following are reasonable (2.4.A1c):	
		a. integers;		a. integers;	
		b. fractions greater than or equal to zero;		b. fractions greater than or equal to zero;	
		c. decimals greater than or equal to zero through ten thousandths place .		c. decimals greater than or equal to zero through ten thousandths place $.	
		1.1.3K. Explains the relative magnitude between whole numbers, fractions greater than or equal to zero, and decimals greater than or equal to zero through ten thousandths place (2.4.K1a).			
		1.1.4K. Knows and explains numerical relationships between percents, decimals, and fractions between 0 and 1 (2.4.K1c). ▲			
		1.1.5K. Uses equivalent representations for the same simple algebraic expression with understood coefficients of 1.			

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	2--Number Systems and their Properties				
		1.2.1K. Classifies subsets of the rational number system as counting numbers, whole numbers, integers, fractions (including mixed numbers), or decimals (2.4.K1l).		1.2.1A. Generates and/or solves real-world problems with rational numbers using the concepts of these properties to explain reasoning (2.4.A1a) :	
				a. commutative and associative properties for addition and multiplication;	
				b. additive and multiplicative identities;	
				c. symmetric property of equality;	
				d. distributive property;	
				e. substitution property;	
				f. addition property of equality ;	
				g. multiplication property of equality ;	
				h. additive inverse property.	
		1.2.2K. Identifies prime and composite numbers and explains their meaning. ▲		1.2.2A. Analyzes and evaluates the advantages and disadvantages of using integers, whole numbers, fractions (including mixed numbers), decimals, or the irrational number pi and its rational approximations in solving a given real-world problem (2.4.A1c-e).	
		1.2.3K. Uses and describes these properties with the rational numbers system and demonstrates their meaning including the use of concrete objects (2.4.K1a):			
		a. commutative properties of addition and multiplication (commutative-changing the order of the numbers does not change the solution; associative-changing the grouping of the numbers does not change the solution);			
		b. identity properties for addition and multiplication (additive identity- zero added to any number is equal to that number: multiplicative identity- one multiplied by any number is equal to that number);			
		c. symmetric property of equality;			
		d. zero property of multiplication (any number multiplied by zero is zero);			

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		e. distributive property (distributing multiplication or division over addition or subtraction) ;			
		f. substitution property (one name of a number can be substituted for another name of the same number);			
		g. addition property of equality (adding the same number to each side of an equation results in an equivalent equation--an equation with the same solution);			
		h. multiplication property of equality (for any equation, if the same number is multiplied to each side of that equation, then the new statement describes an equation equivalent to the original);			
		i. additive inverse property (every number has a value known as its additive inverse and when the original number is added to that additive inverse, the answer is zero).			
		1.2.4K. Recognizes and explains the need for integers.			
		1.2.5K. Recognizes that the irrational number pi can be represented by an approximate rational value.			
	3--Estimation				
		1.3.1K. Estimates quantities with combinations of rational numbers an/or the irrational number pi using various computational methods including mental math, paper and pencil, concrete objects, and/or appropriate technology (2.4.K1a).		1.3.1A. Adjusts original rational number estimate of a real-world problem based on additional information (a frame of reference) (2.4.A1a).	
		1.3.2K. Uses various estimation strategies and explains how they were used to estimate rational number quantities or the irrational number pi.		**1.3.2A. Estimates to check whether or not the result of a real-world problem using rational numbers and/or the irrational number pi is reasonable and makes predictions based on the information (2.4.A1a) $.** N	
		1.3.3K. Recognizes and explains the difference between an exact and an approximate answer (2.4.K1a).		1.3.3A. Selects a reasonable magnitude from given quantities based on a real-world problem and explains the reasonableness of the selection (2.4.A1c).	

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		1.3.4A. Determines the appropriateness of an estimation strategy used and whether the estimate is greater than (overestimate), or less than (underestimate) the exact answer and its potential impact on the result.		1.3.4A. Determines if a real-world problem calls for an exact or an approximate answer and performs the appropriate computation using various computational methods including mental math, paper and pencil, concrete objects and appropriate technology (2.4.A1a).	
	4--Computation				
		1.4.1K. Computes with efficiency and accuracy using various computational methods including mental math, paper and pencil, concrete materials, and appropriate technology (2.4.K1a) $.		1.4.1A. Generates and/or solves one- and two-step real-world problems with rational numbers using these computational procedures (2.4.A1a):	
				a. division with whole numbers;	
				b. addition, subtraction, multiplication, and division of decimals through hundredths place $; ▲	
				c. addition, subtraction, and multiplication of fractions (including mixed numbers).	
		1.4.2K. Performs and explains these computational procedures (2.4.K1a):			
		a. divides whole numbers through a 2-digit divisor and a 4-digit dividend and expresses the remainder as a whole number, fraction, or decimal; **N** ▲			
		b. adds and subtracts decimals from millions place through thousandths place; **N**			
		c. multiplies and divides a 4-digit number by a two-digit number using numbers from thousands place through hundredths place; **N**			
		d. multiplies and divides using numbers from thousands place through thousandths place by 10; 100; 1,000; .1; .01; .001; or single-digit multiples of each; **N**			
		e. adds integers; **N**			
		f. adds, subtracts, and multiplies fractions (including mixed numbers) expressing answers in simplest form; **N** ▲			

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		g. finds the root of perfect whole number squares N			
		h. uses basic order of operations (multiplication and division in order from left to right, then addition and subtraction in order from left to right) with whole numbers; N			
		i. adds, subtracts, multiplies, and divides rational numbers using concrete objects .			
		1.4.3K. Recognizes, describes, and uses different representations to express the same computational procedures.			
		1.4.4K. Identifies, explains and finds the prime factorization of whole numbers (2.4.K1d).			
		1.4.5K. Finds prime factors, greatest common factor, multiples, and the least common multiple (2.4.K1b).			
		1.4.6K. Finds a whole number percent (between 0 and 100) of a whole number (2.4.K1c) $.			
2--ALGEBRA					
	1--Patterns				
		2.1.1K. Identifies, states, and continues a pattern presented in various formats including numeric (list or table), visual (picture, table, or graph), verbal (oral description), kinesthetic (action), and written using these **attributes** include :		2.1.1A. Recognizes the same general pattern presented in different representation [numeric (list or table), visual (picture, table, or graph), and written] (2.4.A1g).	
		a. counting numbers including perfect squares, and factors and multiples (number theory);			
		b. positive rational numbers limited to two operations (addition, subtraction, multiplication, division) including arithmetic sequences (a sequence of numbers in which the difference of two consecutive numbers is the same) (2.4.K1a);			

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		c. geometric figures through two attribute changes;			
		d. measurements;			
		e. things related to daily life $.			
		2.1.2K. Generates a pattern.		2.1.2A. Recognizes multiple representations of the same pattern (2.4..A1a) $.	
		2.1.3K. Extends a pattern when given a rule of one or two simultaneous operational changes (addition, subtraction, multiplication, division) between consecutive terms (2.4.K1g).			
		2.1.4K. States the rule to find the next number of a pattern with one operational change (addition, subtraction, multiplication, division) to move between consecutive terms (2.4.K1d). ▲			
	2--Variables, Equations, and Inequalities				
		2.2.1K. Explains and uses variables and/or symbols to represent unknown whole number quantities and variable relationships (2.4.K1f).		2.2.1A. Represents real-world problems using variables and symbols to (2.4.A1c) $:	
				a. write algebraic or numerical expressions or one-step equations (addition, subtraction, multiplication, division) with whole number solutions (2.2.41d);	
				b. write and/or solve one-step equations (addition, subtraction, multiplication, and division) (2.2.A1d).	
		2.2.2K. Uses equivalent representations for the same simple algebraic expression with understood coefficients of 1 (2.4.K1e-f) .		2.2.2A. Generates real world problems that represent simple expressions or one-step linear equations (addition, subtraction, multiplication, and division) with whole number solutions (2.2.A1e).	
		2.2.3K. Solves $:		2.2.3A. Explains the mathematical reasoning that was used to solve a real-world problem using a one-step equation (addition, subtraction, multiplication, division) (2.2.A1e) $.	
		a. one-step linear equations (addition, subtraction, multiplication, division) with one variable and whole number solutions (2.4.K1e-f);			

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		b. one-step linear inequalities (addition, subtraction) in one variable with whole numbers (2.4.K1f).			
		2.2.4K. Explains and uses equality and inequality symbols and corresponding meanings (is equal to, is less than or equal to) to represent mathematical relationships with positive rational numbers.			
		2.2.5K. Knows and uses the relationship between ratios, proportions, and percents and finds the missing term in simple proportions where the missing term in a whole number (2.4.K1d).			
		2.2.6K. Finds the value of algebraic expressions using whole numbers (2.4.Ka).			
	3--Functions				
		2.3.1K. Recognizes linear relationships using various methods including mental math, paper and pencil, concrete objects, and graphing utilities or appropriate technology (2.4.K1a)		2.3.1A. Represents a variety of mathematical relationships using written and oral descriptions of the rule, tables, graphs, and when possible symbolic notation ((2.4.A1g) $.	
		2.3.2K. Finds the values, determines the rules with one operation of whole numbers using a function table (input/output machine, T-table) (2.4.K1g).		2.3.2A. Interprets and describes the mathematical relationships of numerical, tabular, and graphical representations (2.4.Alf)	
		2.3.3K. Generalizes numerical patterns up to two operations by stating the rule using words (2.4.K1f).			
		2.3.4K. Uses a given function table (input/output machine, T-table) to identify, plot, and label the ordered pairs using the four quadrants of a coordinate plane (2.4.K1g).			
	4--Models				
		2.4.1K. Knows, explains, and uses mathematical models to represent mathematical concepts, procedures, and relationships. Mathematical models include:		2.4.1A. Recognizes that various mathematical models can be used to represent the same problem situation. Mathematical models include:	

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		a. process models (concrete objects, pictures, diagrams, number lines, hundred charts, measurement tools, multiplication arrays, division sets, or coordinate planes/grids) to model computational procedures and mathematical relationships and to solve equations (1.1.K4-5, 1.4.K1-3, 2.2.K2,2.2.K3a, 2.3.K1, 3.4.K1) $;		a. process models (concrete objects, pictures, diagrams, number lines, hundred charts, measurement tools, multiplication arrays, division sets, or coordinate planes/grids) to model computational procedures and mathematical relationships, to represent problem situations, and to solve equations (1.1.A1, 1.4.A1, 3.1.A1-2, 3.2. A1, 3.3.A1-2, 3.4.A1, 4.2.A1) $;	
		b. place value models (place value mats, hundred charts, base ten blocks, or unifix cubes) to compare, order, and represent numberical quantities and to model computational procedures (1.1.K1-4, 1.2.K1,1.3.K1-3, 1.4.K2c-d, 2.2.K4) $;		b. place value models (place value mats, hundred charts, base ten blocks, or unifix cubes) to model problem situations (1.1.A1, 1.2.A1-2, 2.2.A3) $;	
		c. fraction and mixed number models (fraction strips or pattern blocks and decimal and money models (base ten blocks or coins to compare, order, and represent numerical quantities (1.1.K1-4, 1.2.K1, 1.3.K1-3, 1.4.K2b, 1.4.K2d, 1.4.K2f, 1.4.K6, 2.2.K5, 4.1.K4, 4.2.K4) $;		c. fraction and mixed number models (fraction strips or pattern blocks and decimal and money models (base ten blocks or coins to compare, order, and represent numerical quantities (1.1.A1, 1.1.A2b-c, 1.2.A1-2, 1.4.A1b-c) $;	
		d. factor trees to find least common multiple and greatest common factor (1.4.K4-5);		d. factor trees to find least common multiple and greatest common factor;	
		e. equations and inequalities to model numerical relationships (2.2.K3) $;		e. equations to model numerical relationships (2.2.A1-3) $;	
		f. function tables (input/output machines, T-tables) to model numerical and algebraic relationships (2.3.K2, 2.3.K4) $;		f. function tables (input/output machines, T-tables) to model numerical and algebraic relationships (2.3.A1-2) $;	
		g. two-dimensional geometric models (geoboards or dot paper) to model perimeter, area, and properties of geometric shapes and three-dimensional models (nets or solids) and real-world objects to model volume and to identify attributes (faces edges, vertices, bases) of geometric shapes (2.1.K1c, 3.1.K1-5, 3.1.K7-10, 3.2.K7, 3.3.K1-4);		g. two-dimensional geometric models (geoboards or dot paper) to model perimeter, area, and properties of geometric shapes and three-dimensional models (nets or solids) and real-world objects to model volume and to identify attributes (faces, edges, vertices, bases) of geometric shapes (3.1.A1-3, 3.2.A1b, 3.4.A2);	

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		h. tree diagrams to organize attributes and determine the number of possible combinations (4.1.K2)		h. scale drawings to model large and small real-world objects (3.4.A2);	
		i. graphs using concrete objects, two- and three-dimensional geometric models (spinners or number cubes) and process models (concrete objects, pictures, diagrams, or coins) to model probability (4.1.K1-4) $;		i. tree diagrams to organize attributes and determine the number of possible combinations;	
		j. frequency tables, bar graphs, line graphs, circle graphs, Venn diagrams, line plots, charts, tables, single stem-and -leaf plots, and scatter plots to organize and display data (4.2.K1-3) $;		j. two- and three-dimensional geometric models (spinners or number cubes), and process models (concrete objects, pictures, diagrams, or coins) to model probability (4.1.A1-3) $;	
		k. Venn diagrams to sort data and to show relationships (1.2.K1) .		k. graphs using concrete objects, frequency tables, bar graphs, line graphs, circle graphs, Venn diagrams, line plots, charts, tables, and single stem-and -leaf plots to organize, display and interpret data (2.1.A1, 2.3.A1-2, 4.1.A1-2,4.2.A1-3) $;	
				l. Venn diagrams to sort data and to show relationships.	
		2.4.2K. Uses one or more mathematical models to show the relationship between two or more things.		**2.4.2A Selects a mathematical model and justifies why some mathematical models are more accurate than other mathematical models in certain situations.** ▲	
3--GEOMETRY					
	1--Geometric Figures and their Properties				
		3.1.1K. Recognizes and compares properties of plane figures and solids using concrete objects, constructions, drawings, and appropriate technology (2.4.K1h).		3.1.1A. Solves real-world problems by applying the properties of (2.4.A1h) :	
				a. plane figures (regular polygons through 10 sides, circles, and semicircles) and the line(s) of symmetry;	

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				b. solid (cubes, rectangular prisms, cylinders, cones, spheres, triangular prisms)emphasizing faces, edges, vertices, and bases;	
				c. intersecting, parallel, and perpendicular lines.	
		3.1.2K. Recognizes and names regular and irregular polygons through 10 sides including all special types of quadrilaterals: squares, rectangles, parallelograms, rhombi, trapezoids, kites.		3.1.2A. Decomposes geometric figures made from:	
				a. regular and irregular polygons through 10 sides, circles, and semicircles;	
				b. nets (two-dimensional shapes that can be folded into three-dimensional figures).	
		3.1.3K. Names and describes the solids [prisms (rectangular and triangular), cylinders, cones, spheres, and pyramids (rectangular and triangular) using the terms faces, edges, and vertices, and bases (2.4.K1h).		3.1.3A. Composes geometric figures made from:	
				a. regular and irregular polygons through 10 sides, circles, and semicircles;	
				b. nets (two-dimensional shapes that can be folded into three-dimensional figures).	
		3.1.4K. Recognizes all existing lines of symmetry in two-dimensional figures (2.4.K1h).			
		3.1.5K. Recognizes and describes the attributes of similar and congruent figures (2.4.K1h):			
		3.1.6K. Recognizes and uses symbols for angle (find symbol for), line, line segment, ray, parallel, and perpendicular.			
		3.1.7K. Classifies: ▲			
		a. angles as right, obtuse, acute or straight;			
		b. triangles as right, obtuse, acute, scalene, isosceles, or equilateral.			
		3.1.8K. Identifies and defines circumference, radius, and diameter of circles and semicircles.			
		3.1.9K. Recognize that the sum of the angles of a triangle equals 180.			

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		3.1.10K. Determines the radius or diameter of a circle given one or the other.			
	2--Measurement and Estimation				
		3.2.1K. Determines and uses whole number approximations (estimations) for length, width, weight, volume, temperature, time, perimeter, and area using standard and nonstandard units of measure (2.4.K1a) $.		3.2.1A. Solves real-world problems by applying appropriate these measurements formulas:	
				a. perimeter of polygons (2.4.A1e); ▲	
				b. area of squares, rectangles and triangles (2.4.A1e). ▲	
				c. conversions within the metric system	
		3.2.2K. Selects, explains the selection of, and uses measurement tools, units of measure, and a level of precision appropriate for a given situation to find accurate rational number representations for length, weight, volume, temperature, time, perimeter, area, and angle measurements.		**3.2.2A. Estimates to check whether or not measurements and calculations for length, width, weight, volume, temperature, time, perimeter, and area in real-world problems are reasonable and adjusts original measurement or estimation based on additional information (a frame of reference) (2.4.A1a) $.** ▲	
		3.2.3K. Converts:			
		a. within the customary system;			
		b. within the metric system. ▲			
		3.2.4K. Uses customary units of measure to the nearest sixteenth of an inch and metric units of measure to the nearest millimeter.			
		3.2.5K. Recognizes and states perimeter and area formulas for squares, rectangles and triangles :			
		a. uses given measurement formulas to find perimeter and area of : squares and rectangles;			
		b. figures derived from squares and/or rectangles.			
		3.2.6K. Describes the composition of the metric system:			

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		a. meter, liter, and gram (root measures);			
		b. kilo, hecto, deka, deci, centi, and milli (prefixes).			
		3.2.7K. Finds the volume of a rectangular prism using concrete objects			
		3.2.8K. Estimates an approximate value of the irrational number pi.			
	3--Transformational Geometry				
		3.3.1K. Identifies, describes, and performs one or two transformations (reflection, rotation, translation) on a two-dimensional figure (2.4.k1e).		3.3.1A. Describes a transformation of a given two-dimensional figure that moves it from its initial placement (preimage) to its final placement (image) (2.4.A1a,e) .	
		3.3.2K. Reduces (contracts/shrinks) and enlarges (magnifies/grows) simple shapes with simple scale factors (2.4.K1e).		3.3.2K. Makes a scale drawing of a two-dimensional figures using a simple scale (2.4.A1a,e).	
		3.3.3K. Recognizes three-dimensional figures from various perspectives (top, bottom, sides, corners) (2.4.K1e).			
		3.3.4K. Recognizes which figures will tessellate (2.4.K1e).			
	4--Geometry from an Algebraic Perspective				
		3.4.1K. Uses a number line (horizontal/vertical) to order integers and positive rational numbers (in both fractional and decimal form) (2.4.K1a).		3.4.1A. Represents, generates and/or solves real-world problems using a number line using integers (2.4.A1a) $.	
		3.4.2K. Organizes integer data using a T-table and plots the ordered pairs in all four quadrants of a coordinate plane (coordinate grid) (2.4.K1g).		3.2.2A Represents and/or generates real-world problems using a coordinate plane to find (2.4.A1f):	
				a. the perimeter of squares and rectangles;	
				b. the area of triangles, squares, and rectangles.	
		3.4.3K. Uses all four quadrants of the coordinate plane to:			
		a. identify ordered pairs of integer values on a given graph;			
		b. graph ordered pairs of integer values.			
4--DATA					

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	1--Probability				
		4.1.1K. Recognizes that all probabilities range from zero (impossible) through one (certain) and can be written as a fraction, decimal or a percent (2.4.K1i) $.		4.1.1A. Conducts an experiment or simulation with a compound composed of two independent events including the use of concrete objects; records the results in a chart, table, or graph, and uses the results to draw conclusions about the events and makes predictions about future events (2.4.A1i-k).	
		4.1.2K. Lists all possible outcomes of an experiment or simulation with a compound event composed of two independent events in a clear and organized way (2.4.K1h-j). ▲		4.1.2A. Analyzes the results of a given experiment or simulation of a compound event composed of two independent events to draw conclusions and make predictions in a variety of real-world situations (2.4.A1j-k).	
		4.1.3K. Recognizes whether an outcome in a compound event in an experiment or simulation is impossible, certain, likely, unlikely, or equally likely (2.4.K1i).		4.1.3A. Compares what should happen (theoretical probability/expected results) with what did happen (empirical results/experimental probability) in an experiment or simulation with a compound event composed of two independent events (2.4.A1j).	
		4.1.4K. Represents the probability of a simple event in an experiment or simulation using fractions and decimals (2.4.K1c,i). ▲			
	2--Statistics				
		4.2.1K.. Organizes displays and reads numerical (quantitative) and non-numerical (qualitative) data in a clear, organized and accurate manner including a title, labels, categories, and rational number intervals using these **data displays (2.4.K1j** $:		4.2.1A. Uses data analysis (mean, median, mode, range) of a whole number data set or a decimal data set with decimals greater than or equal to zero to make reasonable inferences, predictions, and decisions and to develop convincing arguments from these **data displays** (2.4.A1k) $:	
		a. graphs using concrete objects ;		a. graphs using concrete objects;	
		b. frequency tables and line plots ;		b. frequency tables and line plots ;	
		c. bar, line and circle graphs ;		c. bar, line and circle graphs;	
		d. Venn diagrams or other pictorial displays;		d. Venn diagrams and other pictorial displays;	
		e. charts and tables;		e. charts and tables;	

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		f. single stem-and-leaf plots;		f. single stem-and-leaf plots.	
		g. scatter plots.			
		4.2.2K. Selects and justifies the choice of data collection techniques (observations, interviews, or surveys) and sampling techniques (random sampling, samples of convenience, or purposeful sampling) in a given situation(2.4.K1j).		4.2.2A. Explains advantages and disadvantages of various data displays for a given data set (2.4.A1k) $.	
		4.2.3K. Uses sampling to collect data and describe the results(2.4.K1j) $.		4.2.3A. Recognizes and explains the effects of scale and/or interval changes on graphs of whole number data sets (2.4.A1k).	
		4.2.4K. Determines mean, median, mode, and range for (2.4.K1a,c):			
		a. a whole number data set;			
		b. a decimal data set with decimals greater than or equal to zero.			