K-5 Mathematics Vertical Alignment

		Kindergarten	First Grade	Second Grade
Number and Operations	Connect numerals to their quantities	• Count to 30 • Models and number words through 10 • Write numerals through 20 to label sets • Sequence and identify using ordinal numbers (1st – 10th) • Compare sets up to 10 using more than or less than • Estimate using benchmarks of 5 and 10	• Estimate, model, compare, order, and represent whole numbers to 100 • Compare small sets using terms greater than, less than, and equal to • Understand place value up to 100 • Determine to which 10 a number is closest using tools	• Understand and represent place value to 4 digits using multiple representations (models, drawings, number sentences) • Understand magnitude of numbers • Use equality and inequality signs • Use boxes and __ to represent missing values
		Money • Identify coins by name and value • Count out pennies to 30 cents • Make fair trades (pennies/nickels, pennies/dimes)	**Money** • Identify bills up to $20 • Make fair trades with coins up to $1 and bills up to $20	**Money** • Make change • Use dollar and cent symbols
	Use representations to model addition and subtraction	• Model addition and subtraction • Build and represent number combinations to 10 • Create, solve, and explain story problems for two numbers each less than 10	• Add and subtract numbers less than 100 (without regrouping) • Compose/decompose numbers up to 10 • Understand subtraction as comparing (how many more/less) or taking away • Use addition and subtraction strategies (counting on/back, doubles, making tens) • Solve and create word problems involving addition and subtraction to 100 (without regrouping)	• Add and subtract two whole numbers up to 3 digits (with regrouping) • Understand inverse relationship between addition and subtraction • Use mental math and benchmark numbers to solve problems • Simplify problems using basic properties of addition • Estimate to determine reasonableness
	Use representations to model multiplication and division	• Share objects equally (divide) between two to three people or sets using informal strategies	• Skip count (2s, 5s, 10s) to/from 100 • Share equally (2-5 people) • Build and represent number patterns including even/odd)	• Use repeated addition, arrays, skip counting to multiply and construct the multiplication table • Use repeated subtraction, equal sharing, and forming equal groups to divide and determine factors for multiplication • Solve multiplication problems using expressions.
	Understand and compare fractions		• Understand, identify, label, and relate fractions (fourths, halves) as equal parts of set or whole	• Model, identify, label and compare fractions (thirds, sixths, eighth, tenths) • Know that all fractional parts result in a whole (i.e. three thirds)

Kindergarten	First Grade	Second Grade

K-5 Mathematics Vertical Alignment

	Kindergarten	First Grade	Second Grade
Measurement	• Directly compare/order length, capacity, height, weight (2 objects)	• Compare/order length, capacity, height, weight (more than 2 objects) • Estimate and measure using non-standard units of measure • Create and measure with a tool created by marking off ten segments of repeated single units on a stick, tape, or container	• Understand and represent place value to 4 digits using multiple representations (models, drawings, number sentences) • Understand magnitude of numbers • Use equality and inequality signs • Use boxes and ___ to represent missing values
	Time • Name days of week, months of year, seasons • Understand yesterday, today, and tomorrow • Understand daily schedule • Order daily events • Tell the time when daily events occur, such as morning, afternoon, evening • Name weekly events by day of the week	**Time** • Tell time to nearest hour and ½ hour • Understand movement of hour/minute hand • Understand calendar time relationships (7 days/week, 12 months/year) • Compare/order sequence or duration of events	**Time** • Tell time to nearest 5 minutes • Know time relationships (60 seconds/minute, 60 minutes/hour, 24 hours/day)
			Temperature • Determine reasonable temperature (Fahrenheit) • Read a thermometer (Fahrenheit/Celsius)
Geometry	• Identify, combine, decompose, and compare simple 2-D and 3-D figures [triangles, quadrilaterals (rectangles, squares), circles] • Recognize and name spheres and cubes • Understand spatial relationships (beside, above, below, in front, behind, inside, outside) • Identify, create, extend, and transfer patterns	• Study and create 2-D and 3-D figures (triangles, rectangles, pentagons, hexagons, cylinders, cones, rectangular prisms) • Compare/contrast/classify geometric figures by common attributes • Arrange and describe objects by proximity, position, and direction	• Add and subtract two whole numbers up to 3 Describe/classify plane figures according to sides, vertices, and angles • Describe/classify solid geometric figures according to edges, vertices, faces, and angles • Describe changes as 2-D and 3-D shapes are cut and rearranged
Data Analysis and Probability	• Pose questions, collect, organize, and display data • Display results using objects, pictures, and picture graphs.	• Pose questions, collect, sort, organize, and record data using objects, pictures, tally marks, picture graphs, and bar graphs • Interpret tally marks, picture graphs, and bar graphs	• Use repeated addition, arrays, skip counting to Create, organize, and display data using pictographs, Venn diagrams, bar graphs, picture graphs, simple charts, and tables • Use scale increments of 1, 2, and 5 • Interpret picture graphs, Venn diagrams, and bar graphs
Process Skills	**Solve problems**, **Reason** and evaluate mathematical arguments, **Communicate** mathematically, Make **connections** among mathematical ideas and to other disciplines, **Represent** mathematics in multiple ways.		

K-5 Mathematics Vertical Alignment

Concepts/Skills to Maintain		• Number words • Ordinal numbers • Equivalence • Basic 2-Dimensional and 3-Dimensional geometric shapes • Spatial relationships • Calendar time and daily schedule • Estimating (using 5 and 10 as benchmarks) • Name and value of coins • Measurement (comparing and ordering by direct comparison)	• Fluency with single digit +/1 facts to 18 • Fair trades with coins (to $1) or bills (to $20) • Duration and sequence of events • Number patterns (skip count, odd/even) • Fact families • Fractions: halves, fourths • Tally marks, picture graphs, bar graphs • Estimation: rounding to nearest ten • Telling time measurement (estimating, comparing, ordering) • Basic geometric figures and spatial relationships
Terms/Symbols	numbers through 30, number words through ten, set, longer, shorter, heavier, lighter, morning, afternoon, evening, yesterday, today, tomorrow, days of the week, months of the year, seasons, triangle, quadrilateral, rectangle, square, circle, sphere, cube, beside, above, below, in front of, behind, inside, outside, more, less, equal, ordinal numbers, picture graph	place value: ones, tens, greater than, less than, equal to, fewer than, more than, equivalent, sum/add, difference/subtract, coins: penny, nickel, dime, quarter, bills, fair trade, compare/contrast, length, height, weight, estimate, hexagon, cylinder, cone, rectangular prism, corner, vertex , =, +, -, even, odd, tally mark, bar graph, ½, ¼, skip counting	place value: hundreds, thousands, sum, difference, product, factor, multiple, multiply, regroup, array, numerator, denominator, inch, foot, yard, centimeter, meter, polygon, right angle, obtuse, acute, edge, face, vertex/vertices, prism, plane, >, <, =, ≠, +, -, ×, minute, hour, Venn diagram, pictograph, scale increments, symbol for equality, symbol for inequality

Please Note: The "Concepts/Skills to Maintain" section is not an inclusive list. Please refer to the Georgia Performance Standards for complete information.

		Third Grade	**Fourth Grade**	**Fifth Grade**

K-5 Mathematics Vertical Alignment

N u m b e r a n d O p e r a t i o n s	Understand and represent whole numbers and decimals	• Place value (tenths to ten thousands) • Understand 10 times, 100 times, 1/10 of a single digit • Represent numbers using word name, standard form, and expanded form	• Place Value (hundredths to one million) • Equate number word name, standard form, and expanded form • Determine closest whole number or tenth using number line and/or chart • Round to nearest tenth, whole number, ten, hundred, or thousand • Estimate sum or difference by rounding • Order 2-digit decimals	• Classify counting numbers (odd/even, prime/composite) • Find multiples and factors • Analyze and use divisibility rules • Understand place value of decimal numbers • Analyze effect of multiplying by 10, 100, 1000, 0.1, 0.01, 0.001 • Compare decimals using <, >, or = and justify
	Develop skills in addition and subtraction and apply them in problem solving	• Use properties of addition and subtraction to compute (whole numbers up to 4 digits) • Use mental math and estimation strategies to add and subtract whole numbers • Understand and model addition and subtraction of decimal fractions and common fractions with like denominators • Use mental math and estimation strategies to add/subtract decimal fractions and common fractions with like denominators • Solve problems requiring addition and subtraction of whole numbers, decimal fractions, and common fractions with like denominators **Money** • Model addition and subtraction by counting back change using the fewest number of coins	• Add and subtract 1- and 2-digit decimals • Add and subtract fractions and mixed numbers with common denominators • Use order of operations, including parenthesis • Compute using commutative, associative, and distributive properties • Use mental math and estimation	• Add and subtract common fractions and mixed numbers with unlike denominators • Use mental math and estimation

		Third Grade	**Fourth Grade**	**Fifth Grade**
N u m b	Develop understanding of multiplication	• Know multiplication facts to 10 x 10 • Use arrays and area models to develop an understanding of the distributive property, to determine partial products, and to multiply a 2- or 3-digit number by a 1-digit number. • Apply and verify multiplication properties	• Multiply a 2- or 3-digit number by a 1- or 2-digit number • Know division facts to 100 ÷ 10 • Divide by a 1- or 2-digit number • Understand relationship between dividend, divisor, quotient, and remainder	• Model and explain multiplication and division of decimals • Multiply and divide with decimals (including less than one and greater than one) • Represent division of whole numbers as fractions

er and Operations	and division and apply them in problem solving	• Understand effect of multiplying by multiples of 10 • Understand the relationship between division and multiplication, division and subtraction • Recognize the two situations of division • Explain meaning of remainder • Divide a 2- or 3-digit number by a 1-digit number • Write mathematical expressions for division problem-solving situations • Use mental math and estimation • Solve problems requiring multiplication and division	• Understand and explain effect of multiplying or dividing the divisor and dividend by the same number • Model multiplication and division of decimals by whole numbers • Multiply and divide 1- and 2-digit decimals by whole numbers • Use mental math and estimation	• Model multiplication and division of common fractions • Understand the relationships/rules for multiplication/division of whole numbers apply to decimals • Use mental math and estimation
	Understand and compare fractions	• Understand relationship between decimal fractions and decimals (i.e. 3/10 can be written as 0.3) • Understand the fraction *a/b* represents *a* equal sized parts of a whole divided into *b* equal sized parts • Know and use decimal fractions and common fractions to represent the size of parts created by equal divisions of a whole	• Understand representations of equivalent common fractions and decimal fractions • Use improper fractions and mixed numbers interchangeably	• Find equivalent fractions • Simplify and compare fractions • Find common denominators using concrete, pictorial, and computational models. • Compare fractions and justify the comparisons • Use fractions and decimals interchangeably **Percents** • Explore and model percents using multiple representations • Apply percentages to circle graphs

	Third Grade	Fourth Grade	Fifth Grade
M e a s u r e m e	**Time** • Determine elapsed time to full, half, and quarter hours		**Capacity and Volume Measurement** • Use milliliters, liters, fluid ounces, cups, pints, quarts, and gallons • Compare units within one system
	Linear Measurement • Use kilometers and miles • Measure to nearest ¼ inch, ½ inch, and millimeter • Estimate length • Compare one unit to another within a single system of measurement	**Weight Measurement** • Measure weight in customary and metric units • Compare one unit to another within a single system of measurement	**Geometric Figures** • Estimate area and volume • Derive formula for area of parallelogram, triangle, and circle • Find areas of triangles, parallelograms, and circles using formulae (pi ≈ 3.14) • Estimate area of circle (partitioning, tiling)
	Geometric Figures	**Geometric Figures**	

K-5 Mathematics Vertical Alignment

n t	• Understand perimeter (linear unit, length of the boundary of a figure) • Determine perimeter by measuring and summing lengths of sides • Understand and measure area using square units • Model area by tiling • Determine area of squares and rectangles	• Use tools to measure angles • Understand half and full rotations • Determine that 3 angles in a triangle always total 180°	• Find area of regular and irregular polygons by dividing into squares, rectangles, or triangles • Derive formula for circumference of circle • Determine circumference of circle using the formula and pi ≈ 3.14 • Understand and identify units used in computing volume • Derive formula for volume of cube and rectangular prism • Compute volume of cube and rectangular prism using formulae • Understand similarities/differences between volume and capacity
G e o m e t r y	**Two-Dimensional Figures** • Describe/classify triangles by sides as scalene, isosceles, and equilateral • Identify/compare properties of geometric figures • Examine/compare angles of geometric figures • Identify center, diameter, and radius of circle	**Two-Dimensional Figures** • Define/classify triangles by angles • Describe parallel and perpendicular lines in plane geometric figures • Examine and classify quadrilaterals (parallelograms, squares, rectangles, trapezoids, rhombi) by their properties • Compare and contrast relationships among quadrilaterals • Locate and name a point in the first quadrant • Graph ordered pairs in first quadrant **Three-Dimensional Figures** • Compare and contrast cube and rectangular prism by faces, edges, and vertices • Describe parallel and perpendicular lines in a rectangular prism • Build models for 3-D figures using nets and other representations	**Two-Dimensional Figures** • Understand congruence of geometric figures and correspondence of vertices, sides, and angles • Understand the relationship of the circumference of a circle to its diameter is pi (π ≈ 3.14)

	Third Grade	**Fourth Grade**	**Fifth Grade**
A l g e b r a	• Describe and extend numeric and geometric patterns • Describe and explain quantitative relationships represented by a formula • Use a symbol to represent an unknown and find the value of it	• Understand and apply patterns and rules to describe relationships • Represent unknowns using symbols • Write and evaluate mathematical expressions	• Use variables • Substitute numbers in simple algebraic expressions • Determine that a formula will be reliable regardless of type of number substituted

K-5 Mathematics Vertical Alignment

Data Analysis and Probability	• Construct and interpret line plot graphs, pictographs, Venn diagrams, and bar graphs • Solve problems by organizing and displaying data in charts, tables, and bar graphs • Use scale increments of 1, 2, 5, and 10	• Construct and interpret line graphs, line plot graphs, pictographs, Venn diagrams, and bar graphs • Compare different graphical representations for a given set of data • Investigate features and tendencies of graphs • Identify missing information and duplications in data • Determine and justify the range, mode, and median of a set of data	• Collect, organize, display data using the most appropriate graph (circle graphs, line graphs, bar graphs) • Analyze data in a graph • Compare and contrast multiple graphic representations for a single set of data and discuss advantages and disadvantages of each • Determine and justify the mean, range, mode, and median of a set of data
Process Skill		**Solve problems**, **Reason** and evaluate mathematical arguments, **Communicate** mathematically, Make **connections** among mathematical ideas and to other disciplines, **Represent** mathematics in multiple ways	

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	Third Grade	Fourth Grade	Fifth Grade
Concepts/Skills to Maintain	• Comparison of numbers • Addition and subtraction of multi-digit numbers • Length (cm, m, in, ft, yd) • Time to 5 minutes • Describe and classify geometric shapes • Area models (arrays) of multiplication • Make change	• Multiplication and Division of whole numbers • Area • Perimeter • Length • Time to the minute • Elapsed Time • Count back change using the fewest number of coins	• Addition and subtraction of decimals • Whole numbers computation • Angle measurement • Length, area, and weight • Number sense • Addition and subtraction of common fractions with like denominators • Data usage and representation • Characteristics of 2-D and 3-D shapes • Order of Operations • Properties of addition and multiplication
Terms/Symbols	quotient, whole number, decimal point, place value of 1/10 (tenth), numerator, denominator, second (unit of time), ÷, x, decimal fraction, common fraction, elapsed time, scalene triangle, isosceles triangle, equilateral triangle, bar graph, mile, kilometer, center, diameter, radius, line plot graph	mixed fraction, proper fraction, improper fraction, point, ray, line, line segment, parallel, perpendicular, diagonal line, plane, weight, ounce, pound, ton, gram, kilogram, protractor, degree, rotation, parallelogram, trapezoid, rhombus, rectangular prism, pyramid, coordinate system, ordered pair, line graph, right triangle, acute triangle, obtuse triangle, net, median, mode, range, straight angle	simplify, common denominator, congruence, %, percent, improper fraction, divisibility, multiple, factor, estimate, volume, tiling, irregular polygon, polygon, capacity, circumference, pi, circle graph, cup, pint, quart, gallon, milliliter, liter, mean, ≈, ≅, π

K-5 Mathematics Vertical Alignment

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