GREENWICH CENTRAL SCHOOL DISTRICT

Developmental Mathematics Curriculum
Greenwich Central School
Grades K – 8

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I. NUMBER SENSE AND OPERATIONS (K-4)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Counting	-Count the items in a collection and know the last counting word tells how many items are in the collection (1 to 10) (K.N.1) -Verbally count backwards from 10 (K.N.5) -Visually determine how many more or less, and then using the verbal counting sequence, match and count 1-10 (K.N.10)	-Count the items in a collection and know the last counting word tells how many items are in the collection (1 to 100) (1.N.1) -Count out (produce) a collection of a specified size (10 to 100 items), using groups of ten (1.N.2) -Quickly see and label with a number, collections of 1 to 10 (1.N.3) -Count by 1's to 100 (1.N.4) -Skip count by 10's to 100 (1.N.5) -Skip count by 5's to 50 (1.N.6) -Skip count by 2's to 20 (1.N.7) -Verbally count from a number other than one by 1's (1.N.8) -Count backwards from 20 by 1's (1.N.9) -Name the number before and the number after a given number, and name the number(s) between two given numbers up to 100 (with and without the use of a number line or a hundreds chart) (1.N.20) -Estimate the number in a collection to 50 and then compare by counting the actual items in the collection (1.N.30)	-Skip count to 100 by 2's, 5's, 10's (2.N.1) -Count back from 100 by 1's, 5's, 10's using a number chart (2.N.2) -Skip count by 3's to 36 for multiplication readiness (2.N.3) -Skip count by 4's to 48 for multiplication readiness (2.N.4) -Name the number before and the number after a given number, and name the number(s) between two given numbers up to 100 (with and without the use of a number line or a hundreds chart) (2.N.9) -Estimate the number in a collection to 100 and then compare by counting the actual items in the collection (2.N.22)	-Skip count 25's, 50's, 100's, to 1,000 (3.N.1)	-Skip count by 1,000's (4.N.1)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Place Value	None	-Explore and use place value (1.N.15) -Compare and order whole numbers up to 100 (1.N.16) -Develop an initial understanding of the base ten system: 10 ones= 1 ten 10 tens=1 hundred (1.N.17)	-Compare and order numbers to 100 (2.N.5) -Develop an understanding of the base ten system: 10 ones= 1 ten 10 tens= 1 hundred 10 hundreds= 1 thousand (2.N.6) -Recognize the meaning of zero in the place value system (0-100) (2.N.13)	-Read and write whole numbers to 1,000 (3.N.2) -Compare and order numbers to 1,000 -Understand the place value structure of the base ten number system: 10 ones= 1 ten 10 tens= 1 hundred 10 hundreds= 1 thousand (3.N.4)	-Read and write whole numbers to 10,000 (4.N.2) -Compare and order numbers to 10,000 (4.N.3) -Understand the place value structure of the base ten number system: 10 ones= 1 ten 10 tens= 1 hundred 10 hundreds= 1 thousand 10 thousands= 1 ten thousand(4.N.4)
Whole Numbers	-Solve and create addition and subtraction verbal word problems (use counting-based strategies, such as counting on and to ten) (K.N.12) -Determine sums and differences by various means (K.N.13)	-Develop and use strategies to solve addition and subtraction word problems (1.N.24) -Represent addition and subtraction word problems and their solutions as number sentences (1.N.25) -Use a variety of strategies to solve addition and subtraction problems with one- and two- digit numbers without regrouping (1.N.27) -Demonstrate fluency and apply addition and subtraction facts to and including 1 (1.N.28) -Understand that different parts can be added to get the same whole (1.N.29)	-Use a variety of strategies to solve addition and subtraction problems using one- two- digit numbers with and without regrouping (2.N.16) -Demonstrate fluency and apply addition and subtraction facts up to and including 18 (2.N.17) -Use doubling to add 2-digit numbers (2.N.18) -Use compensation to add 2-digit numbers (2.N.19) -Develop readiness for multiplication by using repeated addition (2.N.20) -Develop readiness for division by using repeated subtraction, dividing objects into groups (fair share) (2.N.21)	-Identify odd and even numbers (3.N.16) -Develop an understanding of the properties of odd/even numbers as a result of addition or subtraction (3.N.17) -Use a variety of strategies to add and subtract 3-digit numbers (with and without regrouping) (3.N.18) -Develop fluency with single-digit multiplication facts (3.N.19) -Use a variety of strategies to solve multiplication problems with factors up to 12x12 (3.N.20) -Demonstrate fluency and apply single-digit division facts (3.N.22) -Developing strategies for selecting the appropriate computational and operational method in problem solving situations (3.N.24)	-Develop an understanding of the properties of odd/even numbers as a result of multiplication (4.N.13) -Use a variety of strategies to add and subtract numbers up to 10,000 (4.N.14) -Select appropriate computational and operational methods to solve problems (4.N.15) -Understand various meanings of multiplication and division (4.N.16) -Use multiplication and division as inverse operations to solve problems (4.N.17) -Use a variety of strategies to multiply two-digit numbers by one-digit numbers (with and without regrouping) (4.N.18) -Use a variety of strategies to multiply two-digit numbers by two-digit numbers (with and without regrouping) (4.N.19) -Develop fluency in multiplying and dividing multiples of 10 and 100 up to 1, 000 (4.N.20) -Use a variety of strategies to divide two-digit dividends by one-digit divisors (with and without remainders) (4.N.21) -Interpret the meaning of remainders (4.N.22)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Properties	None	-Understand the commutative property of addition (1.N.19)	-Understand and use the commutative property of addition (2.N.8) -Use zero as the identity element for addition (2.N.12)	-Use and explain the commutative property of addition and multiplication (3.N.6) -Use 1 as the identity element for multiplication (3.N.7) -Use the zero property of multiplication (3.N.8) -Use and understand the associative property of addition (3.N.9)	-Understand, use, and explain the associative property of multiplication (4.N.6)
Rounding	None	None	None	-Recognize real world situations in which an estimate (rounding) is more appropriate (3.N.26)	-Round numbers less than 1,000 to the nearest tens and hundreds (4.N.26)
Decimals	None	None	None	None	-Develop an understanding of decimals as part of a whole (4.N.10) -Read and write decimals to hundredths using money as a context (4.N.11) -Use concrete materials and visual models to compare and order decimals (less than 1) to the hundredths place in the context of money (4.N.12) -Express decimals as an equivalent form of fractions to tenths and hundredths (4.N.24) -Add and subtract decimals to tenths and hundredths using a hundreds chart (4.N.25)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Fractions	None	None	None	-Develop an understanding of fractions as part of a whole unit and as parts of a collection (3.N.10) -Use manipulatives, visual models, and illustrations to name and represent unit fractions (½, 1/3, ¼, 1/5, 1/6, and 1/10) as part of a whole or a set of objects (3.N.11) -Understand and recognize the meaning of numerator and denominator in the symbolic form of a fraction (3.N.12) -Recognize fractional numbers as equal parts of whole (3.N.13) -Explore equivalent fractions (1/2, 1/3, ¼) (3.N.14*) -Compare and order unit fractions (1/2, 1/3, ¼) and find their approximate locations on a number line (3.N.15*)	-Develop an understanding of fractions as locations on number lines and as divisions of whole numbers ((4.N.7) -Recognize and generate equivalent fractions (halves, fourths, thirds, fifths, sixths, and tenths) using manipulatives, visual models, and illustrations (4.N.8) -Use concrete materials and visual models to compare and order unit fractions or fractions with the same denominator (with and without the use of a number line) (4.N.9) -Add and subtract proper fractions with common denominators (4.N.23) -Express decimals as an equivalent form of fractions to tenths and hundredths (4.N.24)
Ratio and Proportion	None	None	None	None	None
Percents	None	None	None	None	None
Number Theory	None	None	None	None	None
Real Number System	None	None	None	None	None

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Representation	-Represent collections with a finger pattern up to 10 (K.N.6) -Draw pictures or other informal symbols to represent a spoken number up to 10 (K.N.7) -Draw pictures or other informal symbols to represent how many in a collection up to ten. (K.N.8) -Write numbers 1-10 to represent a collection (K.N.9) -Visually determine how many more or less, and then using the verbal counting sequence, match and count 1-10 (K.N.10) -Use and understand verbal ordinal terms first to tenth (K.N.11)	-Draw pictures or other informal symbols to represent a spoken number up to 20 (1.N.10) -Identify that spacing of the same number of objects does not affect the quantity (conservation) (1.N.11) -Arrange objects in size order (increasing and decreasing) (1.N.12) -Write numbers up to 100 (1.N.13) -Read the number words one, two, three…ten (1.N.14) -Use a variety of strategies to compose and decompose one-digit numbers (1.N.18) -Use before, after, or between to order numbers to 100 (with or without the use of a number line) (1.N.21) -Use the words higher, lower, greater, and less to compare two numbers (1.N.22) -Use and understand verbal ordinal terms, first to twentieth (1.N.23) -Represent addition and subtraction word problems and their solutions as number sentences (1.N.25) -Create problem situations that represent a given number sentence (1.N.26)	-Use a variety of strategies to compose and decompose two-digit numbers (2.N.7) -Use and understand verbal ordinal terms (2.N.10) -Read written ordinal terms (first through ninth) and use them to represent ordinal relations (2.N.11) -Use concrete materials to justify a number as odd or even (2.N.14)	-Use a variety of strategies to compose and decompose three-digit numbers (3.N.5) -Use the area model, tables, patterns, arrays, and doubling to provide meaning for multiplication (3.N.21) -Use tables, patterns, halving and manipulatives to provide meaning for division (3.N.23)	-Recognize equivalent representations for numbers up to four digits and generate them by decomposing and composing numbers (4.N.5)
Operations	None	None	None	None	None
Estimating	None	None	None	-Estimate numbers up to 500 (3.N.25) -Recognize real world situations in which an estimate (rounding) is more appropriate (3.N.26) -Check reasonableness of an answer by using estimation (3.N.27)	-Check reasonableness of an answer by using estimation (4.N.27)

I. NUMBER SENSE AND OPERATIONS (5-8)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Counting	None	None	None	None
Place Value	-Read and write whole numbers to millions (5.N.1) -Compare and order numbers to millions (5.N.2) -Understand place value structure up to millions (5.N.3)	-Read and write whole numbers to the trillions (6.N.1)	None	None
Whole Numbers	- Strategies for multiplication of a 3 digit number by a 3 digit number (5.N.16) -Strategies for dividing a 3 digit number by a 1 and 2 digit number (anything greater to be done with technology) (5.N.17)	None	None	None
Properties	None	-Define and identify the commutative and associative properties of addition and subtraction (6.N.2) -Define and identify the distributive property of multiplication over addition (6.N.3) -Define and identify the identity and inverse properties of addition and multiplication (6.N.4) -Define and identify the zero property of multiplication (6.N.5)	None	None
Rounding	-Round numbers to the nearest hundredth and up to 10,000 (5.N.24)	None	None	None
Decimals	-Compare decimals using <, >, or = (5.N.10) -Read, write, and order decimals to the thousandths (5.N.8) -Use a variety of strategies to add, subtract, multiply, and divide to thousandths (5.N.23) -Estimate sums, differences, products, and quotients of decimals (5.N.26)	-Represent fractions as terminating or repeating decimals (6.N.20)	None	None

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Fractions	-Create equivalent fractions (5.N.4) -Compare and order fractions using <, > , and = (5.N.9) -Compare and order fractions with unlike denominators with and without the number line (5.N.5) -Simplify fractions to lowest terms (5.N.19) -Convert improper fractions to mixed numbers and vice versa (5.N.20) -Use a variety of strategies to add/subtract fractions with like denominators (5.N.21) -Add/subtract mixed numbers with like denominators (5.N.22) -Estimate sums and differences of fractions with like denominators (5.N.25)	-Add/subtract fractions with unlike denominators (6.N.16) -Multiply/divide fractions with unlike denominators (6.N.17) -Add, subtract, multiply, and divide mixed numbers (6.N18) -Identify the reciprocal (multiplicative inverse) of a fraction (6.N.19) -Find multiple representations (fractions, decimals, and percents) (6.N.21)	None	None
Ratio and Proportion	-Understand the concept of ratio (5.N.6) -Express ratios in different forms (5.N.7)	-Understand the concept of rate (6.N.6) -Express equivalent ratios as a proportion (6.N.7) -Distinguish the difference between rate and ratio (6.N.8) -Solve proportions using equivalent fractions (6.N.9) -Verify the proportionality using the product of the means equals the product of the extremes (cross products) (6.N.10)	None	None
Percents	-Understand that percent of means part of 100, and write percents as fractions and decimals (5.N.11)	-Read, write, and identify percents of a whole (0% to 100%) (6.N.11) -Solve percent problems involving percent, rate, and base (6.N.12) -Estimate a percent of a quantity (0% to 100%) (6.N.26)	None	-Read, write, and identify percents less than 1% and greater than 100% (8.N.3) -Apply percents to: Tax, percent increase/decrease, simple interest, sale price, commission, interest rates, and gratuities (8.N.4) -Estimate a percent of a quantity, given an application (8.N.5)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Number Theory	-Recognize that some numbers are only divisible by one and themselves (prime) and others have multiple divisors (composite) (5.N.12) -Calculate multiples of a whole number and the least common multiple of two numbers (5.N.13) -Identify the factors of a given number (5.N.14) -Find the common factors and the greatest common factors of two numbers (5.N.15)	None	-Find the common factors and greatest common factor of two or more numbers (7.N.8) -Determine multiples and least common multiples of two or more numbers (7.N.9) -Determine the prime factorization of a given number and write in exponential form (7.N.10)	None
Real Number System	None	-Define absolute value and determine the absolute value of rational numbers (including positive and negative) (6.N.13) -Locate rational numbers on a number line (including positive and negative) (6.N.14) -Order rational numbers (including positive and negative) (6.N.15)	-Distinguish between the various subsets of real numbers (counting/natural, whole numbers, integers, rational numbers, and irrational numbers) (7.N.1) -Recognize the difference between rational and irrational numbers (eg. explore different approximations of π) (7.N.2) -Place rational numbers and irrational numbers (approximations) on a number line and justify the placement of the numbers (7.N.3) -Classify irrational numbers as non-repeating/ non-terminating decimals (7.N.17)	None
Representation	None	-Represent repeated multiplication in exponential form (6.N.23) -Represent exponential form as repeated multiplication (6.N.24)	-Write numbers in scientific notation (7.N.5) -Translate numbers from scientific notation into standard form (7.N.6) -Compare numbers written in scientific notation (7.N.7) -Develop a conceptual understanding of negative and zero exponents with a base of 10 and relate to fractions and decimals (eg. $10^{-2} = .01 = \frac{1}{100}$) (7.N.14)	None

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Operations	-Evaluate an arithmetic expression using order of operations including multiplication, division, addition, subtraction, and parenthesis (5.N.18)	-Evaluate numerical expressions using order of operations (may include exponents of two and three) (6.N.22) -Evaluate expressions having exponents of one, two, or three (6.N.25)	-Simplify expressions using order of operations (Expressions may include absolute values and/or integral exponents greater than 0) (7.N.11) -Add, subtract, multiply, and divide integers (7.N.12) -Develop the laws of exponents for multiplication and division (7.N.4) - Add and subtract two integers (with and without the use of a number line) (7.N.13) - Recognize and state the square root of a perfect square (up to 225) (7.N.15) - Determine the square root of non-perfect squares using a calculator (7.N.16) - Identify the two consecutive whole numbers between which the square root of a non-perfect square whole number less than 225 lies (with and without the use of a number line) (7.N.18)	-Develop and apply the laws of exponents for multiplication and division (8.N.1) -Evaluate expressions with integral exponents (8.N.2)
Estimating	-Justify the reasonableness of answers using estimation (5.N.27)	-Justify the reasonableness of answers using estimation (including rounding) (6.N.27)	-Justify the reasonableness of answers using estimation (7.N.19)	-Justify the reasonableness of answers using estimation (8.N.6)

II. ALGEBRA (K-4)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Expressions	None	None	None	None	-Evaluate and express relationships using open sentences with one operation (4.A.1)
Polynomials	None	None	None	None	None
Equations	None	None	None	None	None
Inequalities	None	None	-Use the symbols <,>,= (with and without the use of a number line) to compare whole numbers up to 100 (2.A.1)	-Use the symbols<,>, or = (with and without the use of a number line) to compare whole numbers and unit fractions (1/2, 1/3, ¼, 1/5, 1/6, and 1/10) (3.A.1)	-Use the symbols <,>, =, and ≠ (with and without the use of a number line) to compare whole numbers and unit fractions and decimals (up to hundredths) (4.A.2) -Find the value or values that will make an open sentence true, if it contains < or > (4.A.3)
Graphing	None	None	None	None	None
Algebraic Functions	-Use of manipulatives to create patterns using attributes of color, size, or shape (K.A.1) -Recognize, describe, extend, and create patterns that repeat (i.e., ABABAB or ABAABAAAB) (K.A.2)	-Determine and discuss patterns in arithmetic (what comes next in a repeating pattern, using numbers or objects) (1.A.1)	-Describe and extend increasing or decreasing (+,-) sequences and patterns (numbers or objects up to 100) (2.A.2)	-Describe and extend numeric (+, -) and geometric patterns (3.A.2)	-Describe, extend, and make generalizations about numeric (+,-, x, ÷) and geometric patterns (4.A.4) -Analyze a pattern or a whole-number function and state the rule, given a table or an input/output box (4.A.5)

II. ALGEBRA (5-8)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Expressions	-Define and use appropriate terminology when referring to constants, variables, and algebraic expressions (5.A.1) -Translate simple verbal expressions into algebraic expressions (5.A.2) -Substitute assigned values into variable expressions and evaluate using order of operation (5.A.3) -Evaluate the perimeter formula for given input values (5.A.6)	-Translate two step verbal expressions into algebraic expressions (6.A.1) -Use substitution to evaluate algebraic expressions (may include exponents of one, two, and three) (6.A.2) -Evaluate formulas for given input values (circumference, area, volume, distance, temperature, interest, etc) (6.A.6)	- Translate two step verbal expressions into algebraic expressions (7.A.1) -Evaluate formulas for given input values (surface area, rate, and density problems) (7.A.6)	-Write verbal expressions that match given mathematical expressions (8.A.1) -Factor algebraic expressions using the GCF (8.A.10)
Polynomials	None	None	-Add and subtract monomials with exponents of one (7.A.2) -Identify a polynomial as an algebraic expression containing one or more terms (7.A.3)	-Use physical models to perform operations with polynomials (8.A.5) -Multiply and divide monomials (8.A.6) -Add and subtract polynomials (with integer coefficients) (8.A.7) -Multiply a binomial by a monomial or binomial (integer coefficients) (8.A.8) -Divide a polynomial by a monomial (integer coefficients) Note: The degree of the denominator is less than or equal to the degree of the numerator for all variables. (8.A.9) -Factor a trinomial in the form of $ax^2 + bx + c; a = 1$ and c having more than 3 sets of factors. (8.A.11)
Equations	-Solve simple one – step equations using basic whole number facts (5.A.4) -Solve and explain simple one-step using inverse operations involving whole numbers (5.A.5)	-Translate two-step verbal sentences into algebraic equations (6.A.3) -Solve and explain two step equations involving whole numbers using inverse operations (6.A.4) -Solve simple proportions within context (6.A.5)	-Solve multi-step equations by combining like terms, using the distributive property, or moving variables to one side of the equation (7.A.4) -Write an equation to represent a function from a table of values (7.A.10*)	-Apply algebra to determine the measure of the angles formed by or contained in parallel lines cut by a transversal and by intersecting lines (8.A.12) -Understand that numerical information can be represented in multiple ways: arithmetically, algebraically, and graphically (8.A.15) -Find a set of ordered pairs to satisfy a given linear numerical pattern (expressed algebraically), then plot the ordered pairs and draw the line (8.A.16) -Interpret multiple representation using equation, table of values and graphs (8.A.9)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Inequalities	None	None	-Solve one-step inequalities (positive coefficients only (7.A.5)	-Translate verbal sentences into algebraic inequalities (8.A.1) -Solve multi-step inequalities and graph the solution on a number line (8.A.13) -Solve linear inequalities by combining like terms, using the distributive property, or moving variables to one side of the inequality (include multiplication or division of inequalities by a negative number) (8.A.14)
Graphing	None	None	-Draw the graphic representation of a pattern from an equation or from an equation or from a table of data (7.A.7)	- Describe a situation involving relationships that match a given graph (8.A.3) -Create a graph given a description or an expression for a situation involving linear or nonlinear relationship (8.A.4) -Understand that numerical information can be represented in multiple ways: arithmetically, algebraically, and graphically (8.A.15) -Find a set of ordered pairs to satisfy a given linear numerical pattern (expressed algebraically), then plot the ordered pairs and draw the line (8.A.16) -Interpret multiple representation using equation, table of values and graph (8.A.19*)
Algebraic Functions	-Create and explain patterns and algebraic relationships (i.e. 2, 4, 6, 8…) algebraically: 2n (5.A.7) -Create algebraic patterns or geometric patterns using concrete objects or visual drawings (e.g. rotate and shade geometric shapes) (5.A.8)	None	-Create algebraic patterns using charts/ tables, graphs, equations, and expressions (7.A.8) -Build a pattern to develop a rule for determining the sum of the interior angles of polygons (7.A.9*)	-Define and use correct terminology when referring to function (domain and range) (8.A.17*) -Determine if a relation is a function (8.A.18*)

III. GEOMETRY (K-4)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Polygons	-Describe characteristics and relationships of geometric objects -Sort groups of objects by size and size order (increasing and decreasing) (K.G.1)	-Recognize, name, describe, create, sort, and compare two-dimensional and three-dimensional shapes (1.G.2) -Recognize geometric shapes and structures in the environment (1.G.5)	-Experiment with slides, flips, and turns to compare two-dimensional shapes (2.G.1) -Identify and appropriately name two-dimensional shapes: circle, square, rectangle, and triangle (both regular and irregular) (2.G.2) -Compose (put together and decompose (break apart) two-dimensional shapes) (2.G.3) -Group objects by like properties (2.G.4)	-Define and use correct terminology when referring to shapes (circle, triangle, square, rectangle, rhombus, trapezoid, and hexagon) (3.G.1)	- Identify and name polygons, recognizing that their names are related to the number of sides and angles (triangle, quadrilateral, pentagon, hexagon, and octagon) (4.G.1)
Triangles	None	None	None	-Define and use correct terminology when referring to shapes (circle, triangle, square, rectangle, rhombus, trapezoid, and hexagon) (3.G.1)	- Identify and name polygons, recognizing that their names are related to the number of sides and angles (triangle, quadrilateral, pentagon, hexagon, and octagon) (4.G.1)
Circles	-Describe characteristics and relationships of geometric objects -Sort groups of objects by size and size order (increasing and decreasing) (K.G.2)	-Recognize, name, describe, create, sort, and compare two-dimensional and three-dimensional shapes (1.G.2) -Recognize geometric shapes and structures in the environment (1.G.5)	None	-Define and use correct terminology when referring to shapes (circle, triangle, square, rectangle, rhombus, trapezoid, and hexagon) (3.G.1)	
Perimeter	None	None	None	None	-Find the perimeter of polygons by adding sides (4.G.3)
Area	None	None	None	None	-Find the area of a rectangle by counting the number of squares needed to cover the rectangle (4.G.4)
Three-dimensional Shapes	-Describe characteristics and relationships of geometric objects -Sort groups of objects by size and size order (increasing and decreasing) (K.G.2)	-Recognize, name, describe, create, sort, and compare two-dimensional and three-dimensional shapes (1.G.2) -Recognize geometric shapes and structures in the environment (1.G.5)	None	-Name, describe, compare, and sort three dimensional shapes: cube, cylinder, sphere, prism, and cone (3.G.3) -Identify the faces on a three dimensional shape as two-dimensional shapes (3.G.4)	- Define and identify vertices, faces, and edges three-dimensional polygons (4.G.5)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Volume	None	None	None	None	None
Similar figures	None	None	None	-Identify congruent and similar figures (3.G.5)	
Congruency	None	-Match shapes and parts of shapes to justify congruency (1.G.1)	None	-Identify congruent and similar figures (3.G.5)	None
Points and Lines	None	None	None	None	-Identify points and line segments when drawing a plane figure (4.G.2) -Draw and identify intersecting, perpendicular, and parallel lines (4.G.6*) -Identify points and rays when drawing angles (4.G.7*)
Angle relationships	None	None	None	None	-Classify angles as acute, obtuse, right, and straight (4.G.8*) -Identify points and rays when drawing angles (4.G.7*)
Symmetry	-Manipulate two and three dimensional shapes to explore symmetry (K.G.4)	-Identify symmetry in two dimensional shapes (1.G.4)	-Explore line symmetry (2.G.6)	-Identify and construct lines of symmetry (3.G.5)	None
Coordinate Geometry	-Understand and use ideas such as over, under, above, below, on , beside, next to, and between (K.G.5)	None	None	None	None
Transformations	-Explore vertical and horizontal orientation of objects (K.G.3)	-Experiment with slides, flips, and turns of two-dimensional shapes (1.G.3)	-Experiment with slides, flips, and turns to compare two-dimensional shapes (2.G.1) -Explore and predict the outcome of slides, flips, and turns to two dimensional shapes (2.G.5)	None	None
Constructions	None	None	None	None	None

III. GEOMETRY (5-8)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Polygons	-Classify quadrilaterals by properties of their sides and angles (5.G.4) -Know that the sum of the interior angles of a quadrilateral is 360 degrees (5.G.5)	None	-Find a missing angle when given angles of a quadrilateral (7.G.7)	None
Triangles	-Identify pairs of similar triangles (5.G.8) -Identify the ratio of corresponding sides of similar triangles (5.G.3) -Classify triangles by properties of their angles and sides (5.G.6) -Know that the sum of the interior angles of a triangle is 180 degrees (5.G.7) -Find a missing angle when given two angles of a triangle (5.G.8) -Identify pairs of congruent triangles (5.G.9) - Identify corresponding parts of congruent triangles (5.G.10)	None	-Identify the right angle, hypotenuse, and legs of a right triangle (7.G.5) -Explore the relationship between the lengths of the three sides of a right triangle to develop the Pythagorean Theorem (7.G.6) -Use the Pythagorean Theorem to determine the unknown length of a side of a right triangle (7.G.8) -Determine whether a given triangle is a right triangle by applying the Pythagorean Theorem and using a calculator (7.G.9)	None
Circle	None	-Identify radius, diameter, chords and central angles of a circle (6.G.5) -Understand the relationship between the diameter and radius of a circle (6.G.6) -Determine the area and circumference of a circle, using the appropriate formula (6.G.7) -Calculate the area of a sector of a circle, given the measure of a central angle and the radius of the circle (6.G.8) -Understand the relationship between the circumference and the diameter of a circle (6.G.9)	-Calculate the radius or diameter, given the circumference or area of a circle (7.G.1)	None
Perimeter	-Calculate the perimeter of regular and irregular polygons (5.G.1)	None	See Algebra	See Algebra

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Area	None	-Determine the area of triangles and quadrilaterals (squares, rectangles, rhombi, and trapezoids) and develop formulas (6.G.2) -Use a variety of strategies to find the area of regular and irregular polygons (6.G.3)	None	None
Three-dimensional Shapes	None	None	-Identify the two-dimensional shapes that make up the faces and bases of three-dimensional shapes (prisms, cylinders, cones and pyramids) (7.G.3) -Determine the surface area of prisms and cylinders, using a calculator and a variety of methods (7.G.4)	None
Volume	None	-Determine the volume of rectangular prisms by counting cubes and develop the formula (6.G.4)	-Calculate the volume of prisms and cylinders, using a given formula and a calculator (7.G.2)	None
Similar figures	None	-Calculate the length of corresponding sides of similar triangles, using proportional reasoning (6.G.1)	None	None

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Angle relationships	None	None	None	-Identify pairs of vertical angles as congruent (8.G.1) -Identify pairs of supplementary and complimentary angles (8.G.2) -Calculate the missing angle in a supplementary or complementary pair (8.G.3) -Determine angle pair relationships when given two parallel lines cut by a transversal (8.G.4) -Calculate the missing angle measurements when given two parallel lines cut by a transversal (8.G.5) -Calculate the missing angle measurements when given two intersecting lines and an angle (8.G.6)
Symmetry	-Identify and draw lines of symmetry of basic geometric shapes (5.G.11)	None	None	None
Coordinate Geometry	-Identify and plot points in the first quadrant (5.G.12*) -Plot points to form basic geometric shapes (identify and classify) (5.G.13*) -Calculate perimeter of basic geometric shapes drawn on a coordinate plane (rectangles and shapes composed of rectangles having sides with integer lengths and parallel to the axes) (5.G.14*)	-Identify and plot points in all four quadrants (6.G.10) -Calculate the area of basic polygons drawn on a coordinate plane (rectangles and shapes composed of rectangles having sides with integer lengths) (6.G.11)	-Graph the solution set of an inequality (positive coefficients only) on a number line (See Algebra) (7.G.10)	-Determine the slope of a line from a graph and explain the meaning of slope as a constant rate of change (8.G.13) -Determine the y-intercept of a line from a graph and be able to explain the y-intercept (8.G.14) -Graph a line using a table of values (8.G.15) -Determine the equation of a line given the slope and the y-intercept (8.G.16) -Graph a line from an equation in slope-intercept form (y=mx+b) (8.G.17) -Solve systems of equations graphically (only linear, integral solutions, y=mx+b format, no vertical/horizontal lines) (8.G.18) -Graph the solution of a set of an inequality on a number line (8.G.19) -Distinguish between linear and nonlinear equations $ax^2 + bx + c$; a=1 (only graphically) (8.G.20) -Recognize the characteristics of quadratics in tables, graphs, equations, and situations (8.G.22)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Transformations	None	None	None	-Describe and identify transformations in the plane, using proper function notation (rotations, reflections, translations, and dilations) (8.G.7) -Draw the image of a figure under rotations of 90 and 180 degrees (8.G.8) -Draw the image of a figure under a reflection over a given line (8.G.9) -Draw the image of a figure under a translation (8.G.10) -Draw the image of a figure under a dilation (8.G.11) -Identify the properties preserved and not preserved under a reflection, rotation, translation, and dilation (8.G.12)
Constructions	None	None	None	-Construct the following using a straight edge and compass: Segment congruent to a segment; angle congruent to an angle; perpendicular bisector; and angle bisector (8.G.0*)

IV. MEASUREMENT (K-4)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Time	-Relate specific times such as morning, noon, afternoon, and evening to activities and absence or presence of daylight (K.M.3)	-Recognize specific times (morning, noon, afternoon, evening) (1.M.7) -Tell time to the hour, using both digital and analog clocks (1.M.8) -Know the days of the week and months of the year in sequence (1.M.9) -Classify months and connect to seasons and other events (1.M.10)	-Tell time to the half hour and five minutes using both digital and analog clocks (2.M.9)	-Relate unit fractions to the faces of the clock: Whole = 60 minutes, ½ = 30 minutes, ¼ = 15 minutes (3.M.8) -Tell time to the minute using analog and digital clocks (3.M.9)	-Calculate elapsed time in hours and half hours, not crossing AM and PM (4.M.9) -Calculate elapsed time in day in days and weeks and using a calendar (4.M.10)
Money	None	-Know vocabulary and recognize coins (penny, nickel, dime, quarter) (1.M.4) -Recognize the cent notation as ¢ (1.M.5) -Use different combinations of coins to make money amounts up to 25 cents (1.M.6)	-Know and recognize coins (Penny, nickel, dime, quarter) and bills($1, $5, $10, and $20) (2.M.6) -Recognize the whole dollar notation as $1, etc. (2.M.7) -Identify equivalent combinations to make one dollar (2.M.8)	-Count and represent combined coins and dollars, using currency symbols ($0.00) (3.M.7)	-Make change, using combined coins and dollar amounts (4.M.8)
Length	-Name, discuss, and compare attributes of length (longer than, shorter than) (K.M.1) -Compare the length of two objects by representing each length with string or paper strip (K.M.2)	-Recognize length as an attribute that can be measured (1.M.1) -Use non-standard units (including finger lengths, paper clips, students' feet and paces) to measure both vertical and horizontal lengths (1.M.2) -Informally explore the standard unit of measure, inch (1.M.3)	-Use non-standard and standard units to measure both vertical and horizontal lengths (2.M.1) -Use a ruler to measure standard units (including whole inches and whole feet) (2.M.2) -Compare and order objects according to the attribute of length (2.M.3)	-Select tools and units (customary) appropriate for the length measured (3.M.1) -Use a ruler/yardstick to measure to the nearest standard unit (whole and ½ inches, whole feet, and whole yards) (3.M.2)	- Select tools and units (customary and metric) appropriate to the length being measured (4.M.1) -Use a ruler to measure to the nearest standard unit (whole, ½ and ¼ inches, whole feet, whole yards, whole centimeters, and whole meters) (4.M.2) -Know and understand equivalent standard units of length: 12 inches = 1 foot, 3 feet = 1 yard (4.M.3)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Mass	None	None	-Recognize mass as a qualitative measure (e.g. Which is heavier? Which is lighter?) (2.M.4) -Compare and order objects, using lighter than and heavier than (2.M.5)	-Measure objects, using ounces and pounds (3.M.3)	-Select tools and units appropriate to the mass of the object being measured (grams and kilograms) (4.M.4) -Measure mass, using grams (4.M.5)
Liquid Capacity/Volume	None	None	None	-Recognize capacity as an attribute that can be measured (3.M.4) -Compare capacities (e.g. Which contains more? Which contains less?) (3.M.5) - Measure capacity, using cups, pints, quarts, and gallons (3.M.6)	-Select tools and units appropriate to the capacity being measured (milliliters and liters) (4.M.6) -Measure capacity, using liters and milliliters (4.M.7)
Surface Area	None	None	None	None	None
Angles	None	None	None	None	None
Scale Drawings	None	None	None	None	None
Estimation	-Select and use non-standard units to estimate measurements	-Select and use standard (customary) and non-standard units to estimate measurements (1.M.11)	-Select and use standard (customary) and non-standard units to estimate measurements (2.M.10)	-Select and use standard (customary) and non-standard units to estimate measurements (3.M.10)	None

IV. MEASUREMENT (5-8)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Time	-Calculate elapsed time in hours and minutes (5.M.7)	None	None	None
Money	None	None	-Calculate unit price using proportions (7.M.5*) -Compare unit prices (7.M.6*) -Convert money between different currencies with the use of an exchange rate table and a calculator (7.M.7*)	None
Length	-Use a ruler to measure the nearest inch, ½, ¼, and 1/8 inch (5.M.1) -Identify customary equivalent units of length (5.M.2) -Measure to the nearest centimeter (5.M.3) -Identify equivalent metric units of length (5.M.4) -Convert measurement within a given system (5.M.5) -Determine the tool and technique to measure with an appropriate level of precision: lengths and angles (5.M.6) -Determine personal references for customary units of length (e.g. your pace is approximately 3 feet, your height is approximately 5 feet, etc.) (5.M.9) -Determine personal references for metric units of length (5.M.10)	None	None	-Solve equations/proportions to convert to equivalent measurements within metric and customary measurements systems Note: Also allow Fahrenheit to Celsius and vice versa (8.M.1)
Mass	None	None	-Identify customary and metric units of mass (7.M.3) -Convert mass within a given system (7.M.4) -Determine personal references for customary/metric units of mass (7.M.12) -Justify the reasonableness of the mass of an object (7.M.13) -Determine the tool and technique to measure with an appropriate level of precision: mass (7.M.9)	-Solve equations/proportions to convert to equivalent measurements within metric and customary measurements systems Note: Also allow Fahrenheit to Celsius and vice versa (8.M.1)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Liquid Capacity/Volume	None	-Measure capacity and calculate the volume of a rectangular prism (6.M.1) -Identify customary units of capacity (cups, pints, quarts, and gallons) (6.M.2) -Identify equivalent customary units of capacity (cups to pints, pints to quarts, and quarts to gallons) (6.M.3) -Identify metric units of capacity (liter and milliliter) (6.M.4) -Identify equivalent metric units of capacity (milliliter to liter and liter to milliliter) (6.M.5) -Determine personal references for capacity (6.M.9) -Determine the tool and technique to measure with an appropriate level of precision: capacity (6.M.6)	-Convert capacities and volumes within a given system (7.M.2)	-Solve equations/proportions to convert to equivalent measurements within metric and customary measurements systems Note: Also allow Fahrenheit to Celsius and vice versa (8.M.1)
Surface Area	None	None	-Estimate the surface area (7.M.11)	None
Angles	-Determine the tool and technique to measure with an appropriate level of precision: lengths and angles (5.M.6) -Measure and draw angles using a protractor (5.M.8)	None	-Draw central angles in a given circle using a protractor (circle graphs) (7.M.8)	None
Scale Drawings	None	None	-Calculate distance using a map scale (7.M.1*)	None
Estimation	-Justify the reasonableness of estimates (5.M.11)	-Estimate volumes, area, and circumferences (see Geometry for figures) (6.M.7)	-Identify the relationship between relative error and magnitude when dealing with large numbers (e.g. money, population) (7.M.10)	None

V. STATISTICS AND PROBABILITY (K-4)

Concept/Skill	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Data Collection	-Gather data in response to questions posed by the teacher and the students (K.S.1)	-Pose questions about themselves and their surrounding (1.S.1) -Collect and record data related to a question (1.S.2) -Use Venn diagrams to sort and describe data (1.S.5)	-Formulate questions about themselves and their surroundings (2.S.1) -Collect and record data (using tallies) related to the question (2.S.2)	-Formulate questions about themselves and their surroundings (3.S.1*) -Collect data using observations and surveys, and record appropriately (3.S.2*)	-Collect data using observations, surveys, and experiments and record appropriately (4.S.2*) -Represent data using tables, bar graphs, and pictographs (4.S.3)
Display of Data	-Help students make simple pictographs for quantities up to 10, where one picture represents 1 (K.S.2) -Sort and organize objects by two attributes (e.g. color, size, or shape) (K.S.3) -Represent data using manipulatives (K.S.4) -Identify more, less, and same amounts from pictographs or concrete models (K.S.5)	-Display data in simple pictographs for quantities up to 20 with units of one (1.S.3) -Display data in bar graphs using concrete objects with intervals of one (1.S.4) -Answer simple questions related to data displayed in pictographs (e.g. category with the most, how many more in a category compared to another, how many all together in two categories) (1.S.7) -Discuss conclusions and make predictions in terms of the words likely and unlikely (1.S.8) -Construct a question that can be answered by using information from a graph (1.S.9)	-Collect and record data (using tallies) related to the question (2.S.2) -Display data in pictographs and bar graphs using concrete objects or a representation of the object (2.S.3) -Compare and interpret data in terms of describing quantity (similarity or differences) (2.S.4) -Discuss conclusions and make predictions from graphs (2.S.5)	-Construct a frequency table to represent a collection of data (3.S.3) -Identify the parts of a pictograph and bar graphs (3.S.4) -Display data in pictographs and bar graphs (3.S.5) -State the relationships between pictographs and bar graphs (3.S.6) -Read and interpret data in pictographs and bar graphs (3.S.7) -Formulate and make predictions from graphs (3.S.8)	-Design investigations to address a question from given data (4.S.1*) -Read and interpret data in line graphs (4.S.4) -Develop and make predictions that are based on data (4.S.5) -Formulate conclusions and make predictions from graphs (4.S.6)
Measures of Central Tendency	None	-Interpret data in terms of the words: most, least, greater than, less than, or equal to (1.S.6)	None	None	None
Probability	None	None	None	None	None

V. STATISTICS AND PROBABILITY (5-8)

Concept/Skill	Grade 5	Grade 6	Grade 7	Grade 8
Data Collection	-Collect and record data from a variety of sources (e.g., newspapers, magazines, polls, charts, and surveys) (5.S.1)	-Develop the concept of sampling when collecting data from a population and decide the best method to collect data for a particular question (6.S.1*)	-Identify and collect data using a variety of methods (7.S.1)	None
Display of Data	-Display data in a line graph to show an increase or decrease over time (5.S.2) -Formulate conclusions and make predictions from graphs (5.S.4)	-Record data in a frequency table (6.S.2*) -Construct Venn Diagrams to sort data (6.S.3*) -Determine and justify the most appropriate graph to display a given set of data (pictograph, bar graph, line graph, histogram, or circle graph) (6.S.4*) -Justify predictions made from data (6.S.8)	-Display data in a circle graph (7.S.2) -Convert raw data into double bar graphs and double line graphs (7.S.3) -Read and record data represented graphically (pictograph, bar graph, histogram, line graph, double line/bar graphs, or circle graph) (7.S.6) -Identify and explain misleading statistics and graphs (7.S.7)	None
Measures of Central Tendency	-Calculate the mean for a given set of data and use to describe a set of data (5.S.3)	-Determine the mean, mode, and median for a given set of data (6.S.5) -Determine the range for a given set of data (6.S.6) -Read and interpret graphs (6.S.7)	-Calculate the range for a given set of data (7.S.4) -Select the appropriate measure of central tendency (7.S.5)	None
Probability	-List the possible outcomes for a single-event experiment (5.S.5*) -Record experiment results using fractions/ratios (5.S.6*) -Create a sample space and determine the probability of a single event, given a simple experiment (e.g. rolling a number cube) (5.S.7*)	-List possible outcomes for compound events (6.S.9) -Determine the probability of dependent events (6.S.10) -Determine the number of possible outcomes for a compound event by using the fundamental counting principle and use this to determine the probabilities of events when the outcomes have equal probability (6.S.11)	-Interpret data to provide the basis for predictions and to establish experimental probabilities (7.S.8) -Determine the validity of sampling methods to predict outcomes (7.S.9) -Predict the outcome of an experiment (7.S.10) -Design and conduct an experiment to test predictions (7.S.11) -Compare actual results to predicted results (7.S.12)	None

*denotes Post April Standards for Grades 3 – 8 as of the 2010 administration of the Grades 3 – 8 NYS Mathematics Testing