Mathematics: New York State Core Curriculum (2005) and the NCTM Curriculum Focal Points
Number Sense and Algebra Alignment by Grade Level (Pre-K-8)

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
PreKindergarten	
Number and Operations: **Developing an understanding of whole numbers, including concepts of correspondence, counting, cardinality, and comparison.** Children develop an understanding of the meanings of whole numbers and recognize the number of objects in small groups without counting and by counting—the first and most basic mathematical algorithm. They understand that number words refer to quantity. They use one-to-one correspondence to solve problems by matching sets and comparing number amounts and in counting objects to 10 and beyond. They understand that the last word that they state in counting tells "how many," they count to determine number amounts and compare quantities (using language such as "more than" and "less than"), and they order sets by the number of objects in them. **Connections to the Focal Points** ***Number and Operations:*** Children use meanings of numbers to create strategies for solving problems and responding to practical situations, such as getting just enough napkins for a group, or mathematical situations, such as determining that any shape is a triangle if it has exactly three straight sides and is closed. Algebra: Children recognize and duplicate simple sequential patterns (e.g., square, circle, square, circle, square, circle,…).	***Number Systems and Operations*** PK.N.1 Count the items in a collection and know the last counting word tells how many items are in the collection (1 to 10) PK.N.2 Count out (produce) a collection of a specified size 1 to 10 PK.N.3 Verbally count by 1's to 10 PK.N.4 Explore the different representations of a group of objects PK.N.5 Draw pictures or other informal symbols to represent a spoken number up to 5 PK.N.6 Draw pictures or other informal symbols to represent how many in a collection up to 5 PK.N.7 Recognize numerals (0-5) PK.N.8 Use and understand the terms *first* and *last* PK.N.9 Develop addition and subtraction readiness with sums up to 4 and subtraction involving one to four items, using manipulatives ***Algebra*** PK.A.1 Duplicate simple patterns using concrete objects
Kindergarten	
Number and Operations: **Representing, comparing, and ordering whole numbers and joining and separating sets.** Children use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set, creating a set with a given number of objects, comparing and ordering sets or numerals by using both cardinal and ordinal meanings, and modeling simple joining and separating situations with objects. They choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the number in a small set, counting and producing sets of given sizes, counting the number in combined sets, and counting backward. **Connections to the Focal Points** ***Algebra:*** Children identify, duplicate, and extend simple number patterns and sequential and growing patterns (e.g., patterns made with shapes) as preparation for creating rules that describe relationships.	***Number Systems and Operations*** K.N.1 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.2 Count out (produce) a collection of a specified size 1 to 10 K.N.3 Numerically label a data set of 1 to 5 K.N.4 Verbally count by 1's to 20 K.N.5 Verbally count backwards from 10 K.N.6 Represent collections with a finger pattern up to 10 K.N.7 Draw pictures or other informal symbols to represent a spoken number up to 10 K.N.8 Draw pictures or other informal symbols to represent how many in a collection up to 10 K.N.9 Write numbers 1-10 to represent a collection K.N.10 Visually determine how many more or less, and then using the verbal counting sequence, match and count 1-10 K.N.11 Use and understand verbal ordinal terms, first to tenth K.N.12 Solve and create addition and subtraction verbal word problems (use counting-based strategies, such as counting on and to ten) K.N.13 Determine sums and differences by various means ***Algebra*** K.A.1 Use a variety of manipulatives to create patterns using attributes of color, size, or shape K.A.2 Recognize, describe, extend, and create patterns that repeat (e.g., ABABAB or ABAABAAAB)

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Number Sense and Algebra Alignment by Grade Level (Pre-K-8)

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 1	

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Number and Operations and ***Algebra:*** **Developing understandings of addition and subtraction and strategies for basic addition facts and related subtraction facts.** Children develop strategies for adding and subtracting whole numbers on the basis of their earlier work with small numbers. They use a variety of models, including discrete objects, length-based models (e.g., lengths of connecting cubes), and number lines, to model "part-whole," "adding to," "taking away from," and "comparing" situations to develop an understanding of the meanings of addition and subtraction and strategies to solve such arithmetic problems. Children understand the connections between counting and the operations of addition and subtraction (e.g., adding two is the same as "counting on" two). They use properties of addition (commutativity and associativity) to add whole numbers, and they create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems involving basic facts. By comparing a variety of solution strategies, children relate addition and subtraction as inverse operations. **Connections to the Focal Points** ***Number and Operations*** and ***Algebra:*** Children use mathematical reasoning, including ideas such as commutativity and associativity and beginning ideas of tens and ones, to solve two-digit addition and subtraction problems with strategies that they understand and can explain. They solve both routine and nonroutine problems. ***Algebra:*** Through identifying, describing, and applying number patterns and properties in developing strategies for basic facts, children learn about other properties of numbers and operations, such as odd and even (e.g., "Even numbers of objects can be paired, with none left over"), and 0 as the identity element for addition.	***Number Systems and Operations*** 1.N.1 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.2 Count out (produce) a collection of a specified size (10 to 100 items), using groups of ten 1.N.3 Quickly see and label with a number, collections of 1 to 10 1.N.4 Count by 1's to 100 1.N.5 Skip count by 10's to 100 1.N.6 Skip count by 5's to 50 1.N.7 Skip count by 2's to 20 1.N.8 Verbally count from a number other than one by 1's 1.N.9 Count backwards from 20 by 1's 1.N.10 Draw pictures or other informal symbols to represent a spoken number up to 20 1.N.11 Identify that spacing of the same number of objects does not affect the quantity (conservation) 1.N.12 Arrange objects in size order (increasing and decreasing) 1.N.13 Write numbers to 100 1.N.14 Read the number words *one, two, three…ten* 1.N.15 Explore and use place value 1.N.16 Compare and order whole numbers up to 100 1.N.17 Develop an initial understanding of the base ten system: 10 ones = 1 ten 10 tens = 1 hundred 1.N.18 Use a variety of strategies to compose and decompose one-digit numbers 1.N.19 Understand the commutative property of addition 1.N.20 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.21 Use before, after, or between to order numbers to 100 (with or without the use of a number line) 1.N.22 Use the words higher, lower, greater, and less to compare two numbers 1.N.23 Use and understand verbal ordinal terms, first to twentieth 1.N.24 Develop and use strategies to solve addition and subtraction word problems 1.N.25 Represent addition and subtraction word problems and their solutions as number sentences 1.N.26 Create problem situations that represent a given number sentence 1.N.27 Use a variety of strategies to solve addition and subtraction problems with one- and two-digit numbers without regrouping 1.N.28 Demonstrate fluency and apply addition and subtraction facts to and including 10 1.N.29 Understand that different parts can be added to get the same whole ***Algebra*** 1.A.1 Determine and discuss patterns in arithmetic (what comes next in a repeating pattern, using numbers or objects)

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Number Sense and Algebra Alignment by Grade Level (Pre-K-8)

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 2	

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Number and Operations: **Developing an understanding of the base-ten numeration system and place-value concepts.** Children develop an understanding of the base-ten numeration system and place-value concepts (at least to 1000). Their understanding of base-ten numeration includes ideas of counting in units and multiples of hundreds, tens, and ones, as well as a grasp of number relationships, which they demonstrate in a variety of ways, including comparing and ordering numbers. They understand multidigit numbers in terms of place value, recognizing that place-value notation is a shorthand for the sums of multiples of powers of 10 (e.g., 853 as 8 hundreds + 5 tens + 3 ones). ***Number and Operations*** and ***Algebra:*** **Developing quick recall of addition facts and related subtraction facts and fluency with multidigit addition and subtraction.** Children use their understanding of addition to develop quick recall of basic addition facts and related subtraction facts. They solve arithmetic problems by applying their understanding of models of addition and subtraction (such as combining or separating sets or using number lines), relationships and properties of number (such as place value), and properties of addition (commutativity and associativity). Children develop, discuss, and use efficient, accurate, and generalizable methods to add and subtract multidigit whole numbers. They select and apply appropriate methods to estimate sums and differences or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including standard algorithms, for adding and subtracting whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems. **Connections to the Focal Points** ***Number and Operations:*** Children use place value and properties of operations to create equivalent representations of given numbers (such as 35 represented by 35 ones, 3 tens and 5 ones, or 2 tens and 15 ones) and to write, compare, and order multidigit numbers. They use these ideas to compose and decompose multidigit numbers. Children add and subtract to solve a variety of problems, including applications involving measurement, geometry, and data, as well as nonroutine problems. In preparation for grade 3, they solve problems involving multiplicative situations, developing initial understandings of multiplication as repeated addition. ***Algebra:*** Children use number patterns to extend their knowledge of properties of numbers and operations. For example, when skip counting, they build foundations for understanding multiples and factors.	***Number Systems and Operations*** 2.N.1 Skip count to 100 by 2's, 5's, 10's 2.N.2 Count back from 100 by 1's, 5's, 10's using a number chart 2.N.3 Skip count by 3's to 36 for multiplication readiness 2.N.4 Skip count by 4's to 48 for multiplication readiness 2.N.5 Compare and order numbers to 100 2.N.6 Develop an understanding of the base ten system: 10 ones = 1 ten; 10 tens = 1 hundred; 10 hundreds = 1 thousand 2.N.7 Use a variety of strategies to compose and decompose two-digit numbers 2.N.8 Understand and use the commutative property of addition 2.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) 2N.10 Use and understand verbal ordinal terms 2.N.11 Read written ordinal terms (first through ninth) and use them to represent ordinal relations 2.N.12 Use zero as the identity element for addition 2.N.13 Recognize the meaning of zero in the place value system (0-100) 2.N.14 Use concrete materials to justify a number as odd or even 2.N.15 Determine sums and differences of number sentences by various means (e.g., families, related facts, inverse operations, addition doubles, and doubles plus one) 2.N.16 Use a variety of strategies to solve addition and subtraction problems using one- and two-digit numbers with and without regrouping. 2.N.17 Demonstrate fluency and apply addition and subtraction facts up to and including 18 2.N.18 Use doubling to add 2-digit numbers 2.N.19 Use compensation to add 2-digit numbers 2.N.20 Develop readiness for multiplication by using repeated addition 2.N.21 Develop readiness for division by using repeated subtraction, dividing objects into groups (fair share) 2.N.22 Estimate the number in a collection to 100 and then compare by counting the actual items in the collection ***Algebra*** 2.A.1 Use the symbols <, >, = (with and without the use of a number line) to compare whole numbers up to 100 2.A.2 Describe and extend increasing or decreasing (+,-) sequences and patterns (numbers or objects up to 100)

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NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 3	

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Number and Operations and ***Algebra:*** **Developing understandings of multiplication and division and strategies for basic multiplication facts and related division facts.** Students understand the meanings of multiplication and division of whole numbers through the use of representations (e.g., equal-sized groups, arrays, area models, and equal "jumps" on number lines for multiplication, and successive subtraction, partitioning, and sharing for division). They use properties of addition and multiplication (e.g., commutativity, associativity, and the distributive property) to multiply whole numbers and apply increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving basic facts. By comparing a variety of solution strategies, students relate multiplication and division as inverse operations. ***Number and Operations:*** **Developing an understanding of fractions and fraction equivalence.** Students develop an understanding of the meanings and uses of fractions to represent parts of a whole, parts of a set, or points or distances on a number line. They understand that the size of a fractional part is relative to the size of the whole, and they use fractions to represent numbers that are equal to, less than, or greater than 1. They solve problems that involve comparing and ordering fractions by using models, benchmark fractions, or common numerators or denominators. They understand and use models, including the number line, to identify equivalent fractions. **Connections to the Focal Points** ***Algebra:*** Understanding properties of multiplication and the relationship between multiplication and division is a part of algebra readiness that develops at grade 3. The creation and analysis of patterns and relationships involving multiplication and division should occur at this grade level. Students build a foundation for later understanding of functional relationships by describing relationships in context with such statements as, "The number of legs is 4 times the number of chairs." ***Number and Operations:*** Building on their work in grade 2, students extend their understanding of place value to numbers up to 10,000 in various contexts. Students also apply this understanding to the task of representing numbers in different equivalent forms (e.g., expanded notation). They develop their understanding of numbers by building their facility with mental computation (addition and subtraction in special cases, such as 2,500 + 6,000 and 9,000 – 5,000), by using computational estimation, and by performing paper-and-pencil computations.	***Number Systems and Operations*** 3.N.1 Skip count by 25's, 50's, 100's to 1,000 3.N.2 Read and write whole numbers to 1,000 3.N.3 Compare and order numbers to 1,000 3.N.4 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.5 Use a variety of strategies to compose and decompose three-digit numbers 3.N.6 Use and explain the commutative property of addition and multiplication 3.N.7 Use 1 as the identity element for multiplication 3.N.8 Use the zero property of multiplication 3.N.9 Understand and use the associative property of addition 3.N.10 Develop an understanding of fractions as part of a whole unit and as parts of a collection 3.N.11 Use manipulatives, visual models, and illustrations to name and represent unit fractions (1/2, 1/3, 1/4, 1/5, 1/6, and 1/10) as part of a whole or a set of objects 3.N.12 Understand and recognize the meaning of numerator and denominator in the symbolic form of a fraction 3.N.13 Recognize fractional numbers as equal parts of a whole 3.N.14 Explore equivalent fractions (½, ⅓, ¼) 3.N.15 Compare and order unit fractions (½, ⅓, ¼) and find their approximate locations on a number line 3.N.16 Identify odd and even numbers 3.N.17 Develop an understanding of the properties of odd/even numbers as a result of addition or subtraction 3.N.18 Use a variety of strategies to add and subtract 3-digit numbers (with and without regrouping) 3.N.19 Develop fluency with single-digit multiplication facts 3.N.20 Use a variety of strategies to solve multiplication problems with factors up to 12 x 12 3.N.21 Use the area model, tables, patterns, arrays, and doubling to provide meaning for multiplication 3.N.22 Demonstrate fluency and apply single-digit division facts 3.N.23 Use tables, patterns, halving, and manipulatives to provide meaning for division 3.N.24 Develop strategies for selecting the appropriate computational and operational method in problem solving situations 3.N.25 Estimate numbers up to 500 3.N.26 Recognize real world situations in which an estimate (rounding) is more appropriate 3.N.27 Check reasonableness of an answer by using estimation ***Algebra*** 3.A.1 Use the symbols <, >, = (with and without the use of a number line) to compare whole numbers and unit fractions (1/2, 1/3, 1/4, 1/5, 1/6, and 1/10) 3.A.2 Describe and extend numeric (+, -) and geometric patterns

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NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 4	

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
***Number and Operations* and *Algebra*: Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication.** Students use understandings of multiplication to develop quick recall of the basic multiplication facts and related division facts. They apply their understanding of models for multiplication (i.e., equal-sized groups, arrays, area models, equal intervals on the number line), place value, and properties of operations (in particular, the distributive property) as they develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers. They select appropriate methods and apply them accurately to estimate products or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems.	***Number Systems and Operations*** 4.N.1 Skip count by 1,000's 4.N.2 Read and write whole numbers to 10,000 4.N.3 Compare and order numbers to 10,000 4.N.4 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.5 Recognize equivalent representations for numbers up to four digits and generate them by decomposing and composing numbers 4.N.6 Understand, use, and explain the associative property of multiplication 4.N.7 Develop an understanding of fractions as locations on number lines and as divisions of whole numbers 4.N.8 Recognize and generate equivalent fractions (halves, fourths, thirds, fifths, sixths, and tenths) using manipulatives, visual models, and illustrations 4.N.9 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.10 Develop an understanding of decimals as part of a whole
***Number and Operations*: Developing an understanding of decimals, including the connections between fractions and decimals.** Students understand decimal notation as an extension of the base-ten system of writing whole numbers that is useful for representing more numbers, including numbers between 0 and 1, between 1 and 2, and so on. Students relate their understanding of fractions to reading and writing decimals that are greater than or less than 1, identifying equivalent decimals, comparing and ordering decimals, and estimating decimal or fractional amounts in problem solving. They connect equivalent fractions and decimals by comparing models to symbols and locating equivalent symbols on the number line.	4.N.11 Read and write decimals to hundredths, using money as a context 4.N.12 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.13 Develop an understanding of the properties of odd/even numbers as a result of multiplication 4.N.14 Use a variety of strategies to add and subtract numbers up to 10,000 4.N.15 Select appropriate computational and operational methods to solve problems 4.N.16 Understand various meanings of multiplication and division 4.N.17 Use multiplication and division as inverse operations to solve problems 4.N.18 Use a variety of strategies to multiply two-digit numbers by one-digit numbers (with and without regrouping) 4.N.19 Use a variety of strategies to multiply two-digit numbers by two-digit numbers (with and without regrouping)
Connections to the Focal Points ***Algebra*:** Students continue identifying, describing, and extending numeric patterns involving all operations and nonnumeric growing or repeating patterns. Through these experiences, they develop an understanding of the use of a rule to describe a sequence of numbers or objects.	4.N.20 Develop fluency in multiplying and dividing multiples of 10 (100) up to 1,000 4.N.21 Use a variety of strategies to divide two-digit dividends by one-digit divisors (with and without remainders) 4.N.22 Interpret the meaning of remainders 4.N.23 Add and subtract proper fractions with common denominators 4.N.24 Express decimals as an equivalent form of fractions to tenths and hundredths
***Number and Operations*:** Building on their work in grade 3, students extend their understanding of place value and ways of representing numbers to 100,000 in various contexts. They use estimation in determining the relative sizes of amounts or distances. Students develop understandings of strategies for multidigit division by using models that represent division as the inverse of multiplication, as partitioning, or as successive subtraction. By working with decimals, students extend their ability to recognize equivalent fractions. Students' earlier work in grade 3 with models of fractions and multiplication and division facts supports their understanding of techniques for generating equivalent fractions and simplifying fraction.	4.N.25 Add and subtract decimals to tenths and hundredths using hundreds chart 4.N.26 Round numbers less than 1,000 to the nearest tens and hundreds 4.N.27 Check reasonableness of an answer by using estimation ***Algebra*** 4.A.1 Evaluate and express relationships using open sentences with one operation 4.A.2 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.3 Find the value or values that will make an open sentence true, if it contains < or > 4.A.4 Describe, extend, and make generalizations about numeric and geometric patterns 4.A.5 Analyze a pattern or a whole-number function and state the rule, given a table or an input/output box

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NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 5	

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
***Number and Operations* and *Algebra:* Developing an understanding of and fluency with division of whole numbers.** Students apply their understanding of models for division, place value, properties, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multidigit dividends. They select appropriate methods and apply them accurately to estimate quotients or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including the standard algorithm, for dividing whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems. They consider the context in which a problem is situated to select the most useful form of the quotient for the solution, and they interpret it appropriately. ***Number and Operations:* Developing an understanding of and fluency with addition and subtraction of fractions and decimals.** Students apply their understandings of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They apply their understandings of decimal models, place value, and properties to add and subtract decimals. They develop fluency with standard procedures for adding and subtracting fractions and decimals. They make reasonable estimates of fraction and decimal sums and differences. Students add and subtract fractions and decimals to solve problems, including problems involving measurement. **Connections to the Focal Points** *Algebra:* Students use patterns, models, and relationships as contexts for writing and solving simple equations and inequalities. They create graphs of simple equations. They explore prime and composite numbers and discover concepts related to the addition and subtraction of fractions as they use factors and multiples, including applications of common factors and common multiples. They develop an understanding of the order of operations and use it for all operations. *Number and Operations:* Building on their work in grade 4, students extend their understanding of place value to numbers through millions and millionths in various contexts. They apply what they know about multiplication of whole numbers to larger numbers. Students also explore contexts that they can describe with negative numbers (e.g., situations of owing money or measuring elevations above and below sea level.)	*Number Systems and operations* 5.N.1 Read and write whole numbers to millions 5.N.2 Compare and order numbers to millions 5.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; 10 ten thousands = 1 hundred thousand; 10 hundred thousands = 1 million 5.N.4 Create equivalent fractions, given a fraction 5.N.5 Compare and order fractions including unlike denominators (with and without the use of a number line) 5.N.6 Understand the concept of ratio 5.N.7 Express ratios in different forms 5.N.8 Read, write, and order decimals to thousandths 5.N.9 Compare fractions using <, >, or = 5.N.10 Compare decimals using <, >, or = 5.N.11 Understand that percent means part of 100, and write percents as fractions and decimals 5.N.12 Recognize that some numbers are only divisible by one and themselves (prime) and others have multiple divisors (composite) 5.N.13 Calculate multiples of a whole number and the least common multiple of two numbers 5.N.14 Identify the factors of a given number 5.N.15 Find the common factors and the greatest common factor of two numbers 5.N.16 Use a variety of strategies to multiply three-digit by three-digit numbers 5.N.17 Use a variety of strategies to divide three-digit numbers by one and two-digit numbers 5.N.18 Evaluate an arithmetic expression using order of operations including multiplication, division, addition, subtraction and parentheses 5.N.19 Simplify fractions to lowest terms 5.N.20 Convert improper fractions to mixed numbers, and mixed numbers to improper fractions 5.N.21 Use a variety of strategies to add and subtract fractions with like denominators 5.N.22 Add and subtract mixed numbers with like denominators 5.N.23 Use a variety of strategies to add, subtract, multiply, and divide decimals to thousandths 5.N.24 Round numbers to the nearest hundredth and up to 10,000 5.N.25 Estimate sums and differences of fractions with like denominators 5.N.26 Estimate sums, differences, products, and quotients of decimals 5.N.27 Justify the reasonableness of answers using estimation

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NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 5	
	Algebra 5.A.1 Define and use appropriate terminology when referring to constants, variables, and algebraic expressions 5.A.2 Translate simple verbal expressions into algebraic expressions 5.A.3 Substitute assigned values into variable expressions and evaluate using order of operations 5.A.4 Solve simple one-step equations using basic whole-number facts 5.A.5 Solve and explain simple one-step equations using inverse operations involving whole numbers 5.A.6 Evaluate the perimeter formula for given input values 5.A.7 Create and explain patterns and algebraic relationships (e.g.,2,4,6,8...) algebraically: 2n (doubling) 5.A.8 Create algebraic or geometric patterns using concrete objects or visual drawings (e.g., rotate and shade geometric shapes)

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NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 6	
Number and Operations: **Developing an understanding of and fluency with multiplication and division of fractions and decimals.** Students use the meanings of fractions, multiplication and division, and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions and explain why they work. They use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain the procedures for multiplying and dividing decimals. Students use common procedures to multiply and divide fractions and decimals efficiently and accurately. They multiply and divide fractions and decimals to solve problems, including multistep problems and problems involving measurement. *Number and Operations:* **Connecting ratio and rate to multiplication and division.** Students use simple reasoning about multiplication and division to solve ratio and rate problems (e.g., "If 5 items cost \$3.75 and all items are the same price, then I can find the cost of 12 items by first dividing \$3.75 by 5 to find out how much one item costs and then multiplying the cost of a single item by 12"). By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative sizes of quantities, students extend whole number multiplication and division to ratios and rates. Thus, they expand the repertoire of problems that they can solve by using multiplication and division, and they build on their understanding of fractions to understand ratios. Students solve a wide variety of problems involving ratios and rates. *Algebra:* **Writing, interpreting, and using mathematical expressions and equations .** Students write mathematical expressions and equations that correspond to given situations, they evaluate expressions, and they use expressions and formulas to solve problems. They understand that variables represent numbers whose exact values are not yet specified, and they use variables appropriately. Students understand that expressions in different forms can be equivalent, and they can rewrite an expression to represent a quantity in a different way (e.g., to make it more compact or to feature different information). Students know that the solutions of an equation are the values of the variables that make the equation true. They solve simple one-step equations by using number sense, properties of operations, and the idea of maintaining equality on both sides of an equation. They construct and analyze tables (e.g., to show quantities that are in equivalent ratios), and they use equations to describe simple relationships (such as $3x = y$) shown in a table.	*Number Systems and operations* 6.N.1 Read and write whole numbers to trillions 6.N.2 Define and identify the commutative and associative properties of addition and multiplication 6.N.3 Define and identify the distributive property of multiplication over addition 6.N.4 Define and identify the identity and inverse properties of addition and multiplication 6.N.5 Define and identify the zero property of multiplication 6.N.6 Understand the concept of rate 6.N.7 Express equivalent ratios as a proportion 6.N.8 Distinguish the difference between rate and ratio 6.N.9 Solve proportions using equivalent fractions 6.N.10 Verify the proportionality using the product of the means equals the product of the extremes 6.N.11 Read, write, and identify percents of a whole (0% to 100%) 6.N.12 Solve percent problems involving percent, rate, and base 6.N.13 Define absolute value and determine the absolute value of rational numbers (including positive and negative) 6.N.14 Locate rational numbers on a number line (including positive and negative) 6.N.15 Order rational numbers (including positive and negative) 6.N.16 Add and subtract fractions with unlike denominators 6.N.17 Multiply and divide fractions with unlike denominators 6.N.18 Add, subtract, multiply, and divide mixed numbers with unlike denominators 6.N.19 Identify the multiplicative inverse (reciprocal) of a number 6.N.20 Represent fractions as terminating or repeating decimals 6.N.21 Find multiple representations of rational numbers (fractions, decimals, and percents 0 to 100) 6.N.22 Evaluate numerical expressions using order of operations (may include exponents of two and three) 6.N.23 Represent repeated multiplication in exponential form 6.N.24 Represent exponential form as repeated multiplication 6.N.25 Evaluate expressions having exponents where the power is an exponent of one, two, or three 6.N.26 Estimate a percent of quantity (0% to 100%) 6.N.27 Justify the reasonableness of answers using estimation (including rounding) *Algebra* 6.A.1 Translate two-step verbal expressions into algebraic expressions 6.A.2 Use substitution to evaluate algebraic expressions (may include exponents of one, two and three) 6.A.3 Translate two-step verbal sentences into algebraic equations 6.A.4 Solve and explain two-step equations involving whole numbers using inverse operations

Connections to the Focal Points ***Number and Operations:*** Students' work in dividing fractions shows them that they can express the result of dividing two whole numbers as a fraction (viewed as parts of a whole). Students then extend their work in grade 5 with division of whole numbers to give mixed number and decimal solutions to division problems with whole numbers. They recognize that ratio tables not only derive from rows in the multiplication table but also connect with equivalent fractions. Students distinguish multiplicative comparisons from additive comparisons. ***Algebra:*** Students use the commutative, associative, and distributive properties to show that two expressions are equivalent. They also illustrate properties of operations by showing that two expressions are equivalent in a given context (e.g., determining the area in two different ways for a rectangle whose dimensions are $x + 3$ by 5). Sequences, including those that arise in the context of finding possible rules for patterns of figures or stacks of objects, provide opportunities for students to develop formulas.	6.A.5 Solve simple proportions within context 6.A.6 Evaluate formulas for given input values (circumference, area, volume, distance, temperature, interest, etc.)

Mathematics: New York State Core Curriculum (2005) and the NCTM Curriculum Focal Points
Number Sense and Algebra Alignment by Grade Level (Pre-K-8)

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 7	

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Number and Operations and ***Algebra*** and ***Geometry:*** **Developing an understanding of and applying proportionality, including similarity** Students extend their work with ratios to develop an understanding of proportionality that they apply to solve single and multistep problems in numerous contexts. They use ratio and proportionality to solve a wide variety of percent problems, including problems involving discounts, interest, taxes, tips, and percent increase or decrease. They also solve problems about similar objects (including figures) by using scale factors that relate corresponding lengths of the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and identify the unit rate as the slope of the related line. They distinguish proportional relationships ($y/x = k$, or $y = kx$) from other relationships, including inverse proportionality ($xy = k$, or $y = k/x$). ***Number and Operations*** and ***Algebra:*** **Developing an understanding of operations on all rational numbers and solving linear equations** Students extend understandings of addition, subtraction, multiplication, and division, together with their properties, to all rational numbers, including negative integers. By applying properties of arithmetic and considering negative numbers in everyday contexts (e.g., situations of owing money or measuring elevations above and below sea level), students explain why the rules for adding, subtracting, multiplying, and dividing with negative numbers make sense. They use the arithmetic of rational numbers as they formulate and solve linear equations in one variable and use these equations to solve problems. Students make strategic choices of procedures to solve linear equations in one variable and implement them efficiently, understanding that when they use the properties of equality to express an equation in a new way, solutions that they obtain for the new equation also solve the original equation. **Connections to the Focal Points** ***Number and Operations:*** In grade 4, students used equivalent fractions to determine the decimal representations of fractions that they could represent with terminating decimals. Students now use division to express any fraction as a decimal, including fractions that they must represent with infinite decimals. They find this method useful when working with proportions, especially those involving percents. Students connect their work with dividing fractions to solving equations of the form $ax = b$, where a and b are fractions. Students continue to develop their understanding of multiplication and division and the structure of numbers by determining if a counting number greater than 1 is a prime, and if it is not, by factoring it into a product of primes.	***Number Systems and Operations*** 7.N.1 Distinguish between the various subsets of real numbers (counting/natural numbers, whole numbers, integers, rational numbers, and irrational numbers) 7.N.2 Recognize the difference between rational and irrational numbers (e.g., explore different approximations of π) 7.N.3 Place rational and irrational numbers (approximations) on a number line and justify the placement of the numbers 7.N.4 Develop the laws of exponents for multiplication and division 7.N.5 Write numbers in scientific notation 7.N.6 Translate numbers from scientific notation into standard form 7.N.7 Compare numbers written in scientific notation 7.N.8 Find the common factors and greatest common factor of two or more numbers 7.N.9 Determine multiples and least common multiple of two or more numbers 7.N.10 Determine the prime factorization of a given number and write in exponential form 7.N.11 Simplify expressions using order of operations *Note: Expressions may include absolute value and/or integral exponents greater than 0.* 7.N.12 Add, subtract, multiply, and divide integers 7.N.13 Add and subtract two integers (with and without the use of a number line) 7.N.14 Develop a conceptual understanding of negative and zero exponents with a base of ten and relate to fractions and decimals (e.g., 10-2 = .01 = 1/100) 7.N.15 Recognize and state the value of the square root of a perfect square (up to 225) 7.N.16 Determine the square root of non-perfect squares using a calculator 7.N.17 Classify irrational numbers as non-repeating/non-terminating decimals 7.N.18 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.19 Justify the reasonableness of answers using estimation ***Algebra*** 7.A.1 Translate two-step verbal expressions into algebraic expressions 7.A.2 Add and subtract monomials with exponents of one 7.A.3 Identify a polynomial as an algebraic expression containing one or more terms 7.A.4 Solve multi-step equations by combining like terms, using the distributive property, or moving variables to one side of the equation 7.A.5 Solve one-step inequalities (positive coefficients only) (See 7.G.10) 7.A.6 Evaluate formulas for given input values (surface area, rate, and density problems) 7.A.7 Draw the graphic representation of a pattern from an equation or from a table of data 7.A.8 Create algebraic patterns using charts/tables, graphs, equations, and expressions 7.A.9 Build a pattern to develop a rule for determining the sum of the interior angles of polygons 7.A.10 Write an equation to represent a function from a table of values

Mathematics: New York State Core Curriculum (2005) and the NCTM Curriculum Focal Points
Number Sense and Algebra Alignment by Grade Level (Pre-K-8)

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Grade 8	

NCTM Curriculum Focal Points	NY Mathematics Core Curriculum 2005
Algebra: **Analyzing and representing linear functions and solving linear equations and systems of linear equations.** Students use linear functions, linear equations, and systems of linear equations to represent, analyze, and solve a variety of problems. They recognize a proportion ($y/x = k$, or $y = kx$) as a special case of a linear equation of the form $y = mx + b$, understanding that the constant of proportionality (k) is the slope and the resulting graph is a line through the origin. Students understand that the slope (m) of a line is a constant rate of change, so if the input, or x-coordinate, changes by a specific amount, a, the output, or y-coordinate, changes by the amount ma. Students translate among verbal, tabular, graphical, and algebraic representations of functions (recognizing that tabular and graphical representations are usually only partial representations), and they describe how such aspects of a function as slope and y-intercept appear in different representations. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines that intersect, are parallel, or are the same line, in the plane. Students use linear equations, systems of linear equations, linear functions, and their understanding of the slope of a line to analyze situations and solve problems.	**Number and Operations** 8.N.1 Develop and apply the laws of exponents for multiplication and division 8.N.2 Evaluate expressions with integral exponents 8.N.3 Read, write, and identify percents less than 1% and greater than 100% 8.N.4 Apply percents to: Tax; Percent increase/decrease; Simple interest; Sale price; Commission; Interest rates; Gratuities 8.N.5 Estimate a percent of quantity, given an application 8.N.6 Justify the reasonableness of answers using estimation **Algebra** 8.A.1 Translate verbal sentences into algebraic inequalities 8.A.2 Write verbal expressions that match given mathematical expressions 8.A.3 Describe a situation involving relationships that matches a given graph 8.A.4 Create a graph given a description or an expression for a situation involving a linear or nonlinear relationship 8.A.5 Use physical models to perform operations with polynomials 8.A.6 Multiply and divide monomials 8.A.7 Add and subtract polynomials (integer coefficients) 8.A.8 Multiply a binomial by a monomial or a binomial (integer coefficients) 8.A.9 Divide a polynomial by a monomial (integer coefficients) 8.A.10 Factor algebraic expressions using the GCF
Data Analysis and *Number and Operations* and *Algebra:* **Analyzing and summarizing data sets.** Students use descriptive statistics, including mean, median, and range, to summarize and compare data sets, and they organize and display data to pose and answer questions. They compare the information provided by the mean and the median and investigate the different effects that changes in data values have on these measures of center. They understand that a measure of center alone does not thoroughly describe a data set because very different data sets can share the same measure of center. Students select the mean or the median as the appropriate measure of center for a given purpose.	8.A.11 Factor a trinomial in the form $ax^2 + bx + c$; $a=1$ and c having no more than three sets of factors 8.A.12 Apply algebra to determine the measure of angles formed by or contained in parallel lines cut by a transversal and by intersecting lines 8.A.13 Solve multi-step inequalities and graph the solution set on a number line 8.A.14 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)
Connections to the Focal Points *Algebra:* Students encounter some nonlinear functions (such as the inverse proportions that they studied in grade 7 as well as basic quadratic and exponential functions) whose rates of change contrast with the constant rate of change of linear functions. They view arithmetic sequences, including those arising from patterns or problems, as linear functions whose inputs are counting numbers. They apply ideas about linear functions to solve problems involving rates such as motion at a constant speed.	8.A.15 Understand that numerical information can be represented in multiple ways: arithmetically, algebraically, and graphically 8.A.16 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.17 Define and use correct terminology when referring to function (domain and range) 8.A.18 Determine if a relation is a function 8.A.19 Interpret multiple representations using equation, table of values, and graph.
Number and Operations: Students use exponents and scientific notation to describe very large and very small numbers. They use square roots when they apply the Pythagorean theorem.	