



Operations and Algebraic Thinking

Skill Developed	Lesson/ Materials
<p>Quantity and Numbers</p> <ul style="list-style-type: none"> Quantities and Values to 10, Teens, 1-100 Writes Numbers 0-9 Greater Than/ Less Than Odd/Even Compare and Order Numbers Ordinal Positions Multiples and Factors Skip Counting <p>Memorization</p> <ul style="list-style-type: none"> Operation Facts Addition Subtraction Multiplication Division 	<p>Quantity and Numbers</p> <ul style="list-style-type: none"> Wooden Hierarchy Material Hundred Board Golden Beads Dictation of numbers with Golden Beads and Bead Frame Handwriting practice for the written formation of numbers Golden Beads for demonstrating odd/even Bead Chains and Card Material for comparing quantities and understanding greater than/less than Decanomial Adjective Command Cards for ordinal numbers Finger Charts Addition/Subtraction Strip Boards Teen Board/Ten Board Snake Game Teacher- made materials Decanomial Stamp Game

State Standards Alignment

Represent and Solve Problems Involving Addition and Subtraction

- NC.1.OA.1: Represent and Solve Addition and subtraction word problems, within 20 with unknowns by using objects, drawings and equations with a symbol for the unknown number to represent the problem.
- NC.1.OA.2: Represent and solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, by using objects, drawings and equations with a symbol for the unknown number to represent the problem.

Understand and Apply the Properties of Operations and the relationship between addition and subtraction

- NC.1.OA.3: Understand and apply the properties of operations for addition.
- NC.1.OA.4: Solve an unknown-addend problem, within 20, by using addition strategies for solving addition problems.

Add and Subtract Within 20

- NC.1.OA.5 Relate counting to addition and subtraction.
- NC.1.OA.6: Add or subtract, within 20, using a variety of strategies such as counting, making 10, decomposing).

Work with Addition and Subtraction Equations

- NC.1.OA.7: Apply understanding of the equal sign to determine if equations involving addition and subtraction are true.
- NC.1.OA.8 Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers.
- Standards: NC.1.OA.9: Demonstrate fluency with addition and subtraction within 10.

Represent and Solve Problems Involving Addition and Subtraction

- NC.2.OA.1 Represent and solve addition and subtraction word problems, within 100, with unknowns in all positions, by using representations and equations with a symbol for the unknown number to represent the problem.

Add and Subtract Within 20

- NC.2.OA.2 Demonstrate fluency with addition and subtraction, within 20 using mental strategies.

Work with Equal Groups of Objects to Gain Foundations for Multiplication

- NC.2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members.
- NC.2.OA.4 Use addition to find the total number of objects arranged in a rectangular array with up to 5 rows and 5 columns.

Operations and Algebraic Thinking	
Skill Developed	Lesson/ Materials
<p>Place Value</p> <ul style="list-style-type: none"> • Uses place value to represent whole numbers and decimals. <p>Math Facts / Whole Number Operations Application of the operations: addition, subtraction, multiplication and division.</p>	<p>Multiples and Factors</p> <ul style="list-style-type: none"> • Bead Chains • Bead Bar Layout • Skip Counting • Peg Board • Multiples Tables (A, B & C) • Factor Trees
State Standards Alignment	
<p>Represent and Solve Problems Involving Multiplication and Division</p> <ul style="list-style-type: none"> • NC.3.OA.1 Interpret products of whole numbers as the total number of objects eg. $5 \times 7 = 35$. • NC.3.OA.2 For whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient. <ul style="list-style-type: none"> ◦ Interpret the divisor and quotient in a division equation. ◦ Illustrate and explain strategies including arrays, repeated addition, or subtraction, and decomposing a factor. • NC.3.OA.3 Represent, interpret, and solve one-step problems involving multiplication and division. • NC.3.OA.4 Determine the unknown whole number in a multiplication or division equation. <p>Understand properties of multiplication and the relationship between multiplication and division</p> <ul style="list-style-type: none"> • NC.OA.5 Apply properties of operations as strategies to multiply and divide. • NC.3.OA.6 Understand division as an unknown-factor problem. <p>Multiply and divide within 100</p> <ul style="list-style-type: none"> • NC.3.OA.7 Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10 <ul style="list-style-type: none"> ◦ Know from memory all products and factors up to and including 10. ◦ Illustrate and explain using the relationship between multiplication and division. ◦ Determine the unknown whole number in a multiplication or division equation relating three whole numbers. <p>Solve problems involving the four operations, and identify and explain patterns in arithmetic</p> <ul style="list-style-type: none"> • 3.OA.8 Solve 2 step word problems using the 4 operations. Represent these with a letter standing for an unknown equation. Assess reasonableness, include rounding. • 3.OA.9 Identify arithmetic problems in the addition or multiplication table and explain them using properties of operations. 	

Numbers and Operations in Base 10			
Skill Developed	Lesson/ Materials		
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> Place Value (The Decimal System) <ul style="list-style-type: none"> • Wooden Hierarchical Material • Golden Beads • Checkerboard and building the Checkerboard • Decimal Board • Card material and teacher-made booklets • Expanded notation and standard form cards • Number Cards/Tiles/Equations • Ten/Teen boards • Hundred Board • Long/short chains/squares and cubes • Stamp Game </td> <td style="width: 50%; vertical-align: top;"> Whole Number Operations <ul style="list-style-type: none"> • Golden Beads & Stamp Game (addition, subtraction, multiplication & division) • Bead Frame (addition, subtraction & multiplication) • Checkerboard and Flat Bead Frame (multiplication) • Racks & Tubes (division) • Teacher-made booklets and paperwork for abstract application of operations </td> </tr> </table>	Place Value (The Decimal System) <ul style="list-style-type: none"> • Wooden Hierarchical Material • Golden Beads • Checkerboard and building the Checkerboard • Decimal Board • Card material and teacher-made booklets • Expanded notation and standard form cards • Number Cards/Tiles/Equations • Ten/Teen boards • Hundred Board • Long/short chains/squares and cubes • Stamp Game 	Whole Number Operations <ul style="list-style-type: none"> • Golden Beads & Stamp Game (addition, subtraction, multiplication & division) • Bead Frame (addition, subtraction & multiplication) • Checkerboard and Flat Bead Frame (multiplication) • Racks & Tubes (division) • Teacher-made booklets and paperwork for abstract application of operations
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State Standards Alignment			
<p>Extend the Counting Sequence</p> <ul style="list-style-type: none"> • NC.1.NBT.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral. <p>Understand Place Value</p> <ul style="list-style-type: none"> • NC.1.NBT.2: Understand that the two digits of a two-digit number represents amounts of tens and ones. • NC.1.NBT.3: Compare two two-digit numbers based on the value of the tens and ones digits, recording the results of comparisons with the symbols, $>$, $=$, and $<$. • NC.1.NBT.4: Using concrete models or drawings, strategies based on place value, properties of operations, and explaining the reasoning used, add, within 100, in the following situations: <ul style="list-style-type: none"> ◦ A two-digit number and a one-digit number. ◦ A two-digit number and a multiple of 10. • NC.1.NBT.5: Given a two-digit number, mentally find 10 more or 10 less than the number. • NC.1.NBT.6: Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90. • NC.1.NBT.7 Read and write numerals, and represent a number of objects with a written numeral, to 100. <p>Understand Place Value</p> <ul style="list-style-type: none"> • NC.2.NTB.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens and ones. Understand Place Value • NC.2.NBT.2 Count within 1,000; skip-count by 5s, 10s, and 100s. • NC.2.NBT.3 Read and write number to 1000 using base-ten numerals, number names, and expanded form. • NC.2.NBT.4 Compare two three-digit numbers based on the meanings of the hundreds, tens, and ones using $<$, $>$, $=$ symbols to record comparisons <p>Use Place Value Understanding and Properties of Operations to Add and Subtract</p> <ul style="list-style-type: none"> • NC.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations. • NC.NBT.7 Add and Subtract within 1000 using models, drawings, strategies based on place value and properties. Some decomposing necessary. • NC.NBT. 8 Mentally add or subtract 10 or 100 to a given number 10 - 900 • NC. NBT.9 Explain why addition and subtraction strategies work. • NC.NBT. 1 Use place value understanding to round whole numbers to the nearest 10 or 100. • NC.3.NBT.2 Add and subtract whole numbers up to and including 1,000 <ul style="list-style-type: none"> ◦ Use estimation strategies to assess the reasonableness of answers ◦ Model and explain how the relationship between addition and subtraction can be applied to solve addition and subtraction problems. ◦ Use expanded form to decompose numbers and then find sums and differences. • NC.3.NBT.3 Use concrete and pictorial models based on place value and the properties of operations to find the product of a one-digit whole number by a multiple of 10 			

Numbers and Operations: Fractions	
Skill Developed	Lesson/ Materials
<p>Fractions</p> <ul style="list-style-type: none"> • Understands Concepts of Fractions <ul style="list-style-type: none"> ○ Fraction Vocabulary ○ Improper and Mixed Fractions Including Conversions ○ Read Up to the Tenths Place • Fraction Nomenclature and Representation • Operations with Fractions • Decimal Fractions 	<p>Fractions</p> <ul style="list-style-type: none"> • Nomenclature of fractions • Fraction skittles for demonstration • Metal insets and fraction pieces for equivalents and operations • Three-part matching card material • Number Lines
State Standards Alignment	
<p>Develop Understanding of Fractions as Numbers</p> <ul style="list-style-type: none"> • NC.3. NF.1 Interpret unit fractions with denominators of 2,3,4,6, and 8 as quantities formed when a whole is partitioned into equal parts. <ul style="list-style-type: none"> ○ Explain that a unit fraction is one of those parts. ○ Represent and identify unit fractions using area and length models. • NC.3.NF.2 Interpret fractions with denominators of 2,3,4,6 and 8 using area and length models. <ul style="list-style-type: none"> ○ Using an area model, explain that the numerator of a fraction represents a number of equal parts of the unit fraction. ○ Using a number line, explain that the numerator of a fraction represents the number of lengths of the unit fraction from 0. • NC.3.NF.3 Represent equivalent fractions with area and length models by: <ul style="list-style-type: none"> ○ Composing and decomposing fractions into equivalent fractions. ○ Explaining that a fraction with the same numerator and denominator equals one whole. ○ Expressing whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. ○ Compare two fractions with the same numerator or the same denominator by reasoning about their size, using area and length models , and using the <, >, and = symbols. 	

Measurement and Data			
Skill Developed	Lesson/ Materials		
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> Measurement <ul style="list-style-type: none"> • Montessori Clocks/ Judy Clocks • Clock Stamps • Card Material • Measurement sets </td> <td style="width: 50%; vertical-align: top;"> Money <ul style="list-style-type: none"> • Plastic Money Pieces • Card Material • Money Games • Money Flashcards • Adding and Subtracting with Money • Word Problems with Money </td> </tr> </table>	Measurement <ul style="list-style-type: none"> • Montessori Clocks/ Judy Clocks • Clock Stamps • Card Material • Measurement sets 	Money <ul style="list-style-type: none"> • Plastic Money Pieces • Card Material • Money Games • Money Flashcards • Adding and Subtracting with Money • Word Problems with Money
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State Standards Alignment			
<p>Measure Lengths Indirectly and by Iterating Length Units</p> <ul style="list-style-type: none"> • NC.1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. • NC.1.MD.2 Measure lengths with non-standard units. <p>Tell and Write Time</p> <ul style="list-style-type: none"> • NC.1.MD.3 Tell and write time in hours and half-hours using analog and digital clocks. <p>Represent and Interpret Data</p> <ul style="list-style-type: none"> • NC.1.MD.4 Organize, represent, and interpret data with up to three categories. • NC.1.MD.5 Identify quarters, dimes and nickels and relate their values to pennies. <p>Measure and estimate lengths in standard units</p> <ul style="list-style-type: none"> • NC.2.MD.1 Measure the length of an object in standard units by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. • NC.2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. • NC.2.MD.3 Estimate lengths in using standard units of inches, feet, yards, centimeters, and meters. • NC.2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard-length unit. • NC.2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, using equations with a symbol for the unknown number to represent the problem. • 2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to numbers and represent whole-number sums and differences within 100 on a number line diagram. <p>Work with Time and Money</p> <ul style="list-style-type: none"> • NC.2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. • NC.2.MD.8 Solve word problems involving: <ul style="list-style-type: none"> ◦ Quarters, dimes, nickels, and pennies within 99¢, using ¢ symbols appropriately. ◦ Whole dollar amounts, using the \$ symbol appropriately 			

Measurement and Data	
Skill Developed	Lesson/ Materials
<p>Graphing</p> <ul style="list-style-type: none"> • Grids and Graphing <ul style="list-style-type: none"> ○ Picture Graph ○ Bar Graph ○ Pie Graph ○ Venn Diagram ○ Tables 	<p>Graphing</p> <ul style="list-style-type: none"> • Group graphing exercises (counting, tallies, tracking) • Classroom data collections • Venn Diagrams integrated with Language, Biology and Geometry • Test Prep • ETC Graphing Work • Teacher Made Materials
State Standards Alignment	
<p>Represent and Interpret Data</p> <ul style="list-style-type: none"> • MCD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same objects. Show the measurements by making a line plot with whole number units. • NC.2.MD.10 Organize, represent, and interpret data with up to four categories. <ul style="list-style-type: none"> ○ Draw a picture graph and a bar graph with a single-unit scale to represent a data set. ○ Solve simple put-together, take-apart, and compare problems using information presented in a picture and a bar graph. <p style="margin-left: 40px;">Solve problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects</p> • NC.3.MD.1 Tell and write time to the nearest minute. Solve word problems involving addition and subtraction of time intervals within the same hour • 3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams, kilograms and liters. Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes in the same units. <p>Represent and Interpret data</p> <ul style="list-style-type: none"> • NC.3. MD.3 Represent and interpret scaled picture and bar graphs <ul style="list-style-type: none"> ○ Collect data by asking a question that yield data in up to four categories ○ Make a representation of data and interpret data in a frequency table, scaled picture graph, and/or scaled bar graph with axes provided ○ Solve one and two-step “how many more” and “how many less” problems using the information on these graphs. • NC.3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show data by making a line plot using whole numbers, halves or quarters. <p>Understand Concepts of Area and Relate Area to Multiplication and to Addition</p> <ul style="list-style-type: none"> • NC.3.MD.5 Find the area of a rectangle with whole-number side lengths by tiling without gaps or overlaps and counting unit squares • NC.3.MD.6 Measure area by counting unit squares • NC.3.MD.7 Relate area to the operations of multiplication and addition • NC. 3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including unknown sides and values. 	

Geometry	
Skill Developed	Lesson/ Materials
<p>Geometry</p> <ul style="list-style-type: none"> • Shapes nomenclature • Identify, extend and create patterns • Concepts of point, line, surface, solid • Relationship between figures • Study of 2 dimensional and 3 dimensional shapes • Use words and numbers to describe the size of objects • Comparing and sorting objects • Combining shapes to make new shapes • types of angles • measuring angles 	<p>Geometry</p> <ul style="list-style-type: none"> • Geometry cabinet • Geometric Solids • Constructive triangles for congruency and equivalency • Nomenclature material for all topics • Box of sticks for presentations and follow-up • Fraction insets for congruency, similarity and equivalency • Montessori protractor for measuring angles and fractions • Regular protractor for measuring angles • Geometry Task Cards • Yellow area material • Work with a ruler - objects for measuring
State Standards Alignment	
<p>Reason with Shapes and their attributes</p> <ul style="list-style-type: none"> • NC.1.G.1 Distinguish between defining and non-defining attributes and create shapes with defining attributes • NC.1.G.2 Compose 2 or 3 dimensional shapes to create a composite shape and compose new shapes from the composite shape. • NC.1.G.3 Put together two pieces to make a shape that relates to the whole using words such as halves, fourths, quarters • NC.2.G.1 Recognize and draw triangles, quadrilaterals, pentagons and hexagons, having specified attributes; recognize and describe attributes of rectangular prisms and cubes. • NC.2.G.3 Partition circles and rectangles into two, three, or four equal shares. • NC.2.G.3 Partition circles and rectangles into two, three, or four equal shares. <ul style="list-style-type: none"> ◦ Describe the shares using the words halves, thirds, half of, a third of, fourths, fourth of, quarter of. ◦ Describe the whole as two halves, three thirds, four fourths. ◦ Explain that equal shares of identical wholes need not have the same shape. • NC.3. G.1 Reason with two-dimensional shapes and their attributes <ul style="list-style-type: none"> ◦ Investigate, describe and reason about composing triangles and quadrilaterals and decomposing quadrilaterals ◦ Recognize and draw examples and non-examples of types of quadrilaterals including rhombuses, rectangles, squares, parallelograms, and trapezoids 	

Problem Solving	
Skill Developed	Lesson/ Materials
Problem Solving <ul style="list-style-type: none">• One step problems with all operations• Multi-step problems with addition and subtraction• Word problems with time, money, place value, numeration and estimation.	Problem Solving <ul style="list-style-type: none">• Word problems cards• Various Task Cards (teacher made, ETC)
State Standards Alignment	
Applied to meet all standards.	