

Afterschool Achievers: Math Club © 2002

correlated to

New Jersey Mathematics
Academic & Professional
Standards

Grades K-8



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Afterschool Achievers: Math Club Kindergarten © 2002
correlated to
New Jersey Mathematics
Academic & Professional Standards
Grade 2

Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>A. Number Sense</i></p> <p>1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 2 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • Whole numbers through hundreds • Ordinals • Proper fractions (denominators of 2, 3, 4, 8, 10) 	<p>Instructor's Guide: 2, 4, 5, 7, 9, 10, 12, 14, 17, 19, 22, 24, 27, 29, 30, 34, 35, 39, 44, 48, 49, 54, 55, 58, 59, 60, 62, 64, 68, 69, 74, 77, 79, 80, 81, 84, 88, 89, 94, 98, 99, 103, 105, 108, 110, 118, 129, 130, 134, 135, 139, 144, 149, 152, 154, 155, 159, 163, 174</p>
<p>2. Demonstrate an understanding of whole number place value concepts.</p>	<p>Instructor's Guide: 72, 152</p>
<p>3. Understand that numbers have a variety of uses.</p>	<p>Instructor's Guide: The opportunity to address this objective is available throughout the text.</p>
<p>4. Count and perform simple computations with coins.</p> <ul style="list-style-type: none"> • Amounts up to \$1.00 (using cents notation) 	<p>Instructor's Guide: 122</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
5. Compare and order whole numbers.	Instructor's Guide: 38, 48, 58, 62, 68, 82, 88, 98, 103, 104, 108, 109, 112, 114, 117, 118, 119, 124, 129, 134, 139
<p><i>B. Numerical Operations</i></p> <p>1. Develop the meaning of addition and subtraction by concretely modeling and discussing a large variety of problems.</p> <ul style="list-style-type: none"> • Joining, separating, and comparing 	Instructor's Guide: 60, 67, 80, 85, 110, 127, 135, 142, 144, 149, 154, 159, 161, 164, 169, 174, 177, 179
2. Explore the meanings of multiplication and division by modeling and discussing problems.	Instructor's Guide: n/a
3. Develop proficiency with basic addition and subtraction number facts using a variety of fact strategies (such as "counting on" and "near doubles") and then commit them to memory.	Instructor's Guide: 104, 127, 142, 162, 169, 174, 179
<p>4. Construct, use and explain procedures for performing addition and subtraction calculations with:</p> <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	Instructor's Guide: 38, 48, 58, 62, 68, 82, 88, 98, 103, 104, 108, 109, 112, 114, 118, 124, 127, 129, 134, 139, 142, 160, 162, 177, 179
<p>5. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.</p> <ul style="list-style-type: none"> • Addition of 2-digit numbers • Subtraction of 2-digit numbers 	Instructor's Guide: n/a
6. Select pencil-and-paper, mental math or a calculator as the appropriate computational method depending on the context and numbers.	Instructor's Guide: n/a
7. Check the reasonableness of the results of computations.	<p>The opportunity to address this objective is available on the following pages:</p> <p>Instructor's Guide: 38, 48, 58, 62, 68, 82, 88, 98, 103, 104, 108, 109, 112, 114, 118, 124, 127, 129, 134, 139, 142, 160, 162, 177, 179</p>
8. Understand and use the inverse relationship between addition and subtraction.	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>C. Estimation</i></p> <p>1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor's Guide: 2, 4, 5, 7, 9, 10, 12, 14, 17, 19, 22, 24, 27, 29, 30, 34, 35, 39, 44, 48, 49, 54, 55, 58, 59, 60, 62, 64, 68, 69, 74, 77, 79, 80, 81, 84, 88, 89, 94, 98, 99, 103, 105, 108, 110, 118, 129, 130, 134, 135, 139, 144, 149, 152, 154, 155, 159, 163, 174</p>
<p>2. Determine the reasonableness of an answer by estimating the result of computations (e.g., $15 + 16$ is not 211).</p>	<p>Instructor's Guide: n/a</p>
<p>3. Explore a variety of strategies for estimation both quantities (e.g., the number of marbles in a jar) and results of computation.</p>	<p>Instructor's Guide: n/a</p>

Standard 4.2 Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>A. Geometric Properties</i></p> <p>1. Identify and describe spatial relationships among objects in space and their relative shapes and sizes.</p> <ul style="list-style-type: none"> • Inside/outside, left/right, above/below, between • Small/larger/same size, wider/narrower, longer/shorter • Congruence (i.e., same size and shape) 	<p>Instructor's Guide: 15, 40, 42, 61, 69, 95, 125</p>
<p>2. Use concrete objects, drawings, and computer graphics to identify, classify, and describe standard three-dimensional and two-dimensional shapes.</p> <ul style="list-style-type: none"> • Vertex, edge, face, side • 3D figures-cub, rectangular prism, sphere, cone, cylinder, and pyramid • 2D figures-square, rectangle, circle, triangle • Relationships between three- and two-dimensional shapes (i.e., the face of a 3D shape is a 2D shape) 	<p>Instructor's Guide: 1, 6, 11, 16, 20, 23, 26, 37, 45, 53, 61, 63, 66, 70, 71, 73, 78, 87, 102, 107, 113, 120, 133, 137, 145, 148, 170, 172, 178</p>
<p>3. Describe, identify and create instances of line symmetry.</p>	<p>Instructor's Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
4. Recognize, describe, extend and create designs and patterns with geometric objects of different shapes and colors.	Instructor's Guide: 75, 121, 126, 131, 136, 171
<i>B. Transforming Shapes</i> 1. Use simple shapes to make designs, patterns, and pictures.	Instructor's Guide: 20
2. Combine and subdivide simple shapes to make other shapes.	Instructor's Guide: n/a
<i>C. Coordinate Geometry</i> 1. Give and follow directions for getting from one point to another on a map or grid.	Instructor's Guide: n/a
<i>D. Units of Measurement</i> 1. Directly compare and order objects according to measurable attributes. <ul style="list-style-type: none"> • Attributes-length, weight, capacity, time, temperature 	Instructor's Guide: 47, 65, 90, 92, 115, 140, 165, 180
2. Recognize the need for a uniform unit of measure.	Instructor's Guide: n/a
3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real-life problems. <ul style="list-style-type: none"> • Length-inch, foot, yard, centimeter, meter • Weight-pound, gram, kilogram • Capacity-pint, quart, liter • Time-second, minute, hour, day, week, month, year • Temperature-degrees Celsius, degrees Fahrenheit 	Instructor's Guide: 43, 132, 140, 165
4. Estimate measures.	Instructor's Guide: n/a
<i>E. Measuring Geometric Objects</i> 1. Directly measure the perimeter of simple two-dimensional shapes.	Instructor's Guide: n/a
2. Directly measure the area of simple two-dimensional shapes by covering them with squares.	Instructor's Guide: n/a

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>A. Patterns</i></p> <p>1. Recognize, describe, extend, and create patterns.</p> <ul style="list-style-type: none"> • Using concrete materials (manipulatives), pictures, rhythms, & whole numbers • Descriptions using words and symbols (e.g., “add tow” or “+2”) • Repeating patterns • Whole number patterns that grow or shrink as a result of repeatedly adding or subtracting a fixed number (e.g., skip counting forward or backward) 	<p>Instructor’s Guide: 50, 57, 72, 75, 97, 100, 121, 126, 131, 136, 141, 146, 150, 151, 156, 157, 161, 166, 167, 171, 175, 176</p>
<p><i>B. Functions and Relationships</i></p> <p>1. Use concrete and pictorial models of function machines to explore the basic concept of a function.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>C. Modeling</i></p> <p>1. Recognize and describe changes over time (e.g., temperature, height).</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Construct and solve simple open sentences involving addition or subtraction.</p> <ul style="list-style-type: none"> • Result unknown (e.g., $6-2=$__ or $n=3+5$) • Part unknown (e.g., $3+$__=8) 	<p>Instructor’s Guide: n/a</p>
<p><i>D. Procedures</i></p> <p>1. Understand and apply (but don’t name)the following properties of addition:</p> <ul style="list-style-type: none"> • Commutative (e.g., $5+3=3+5$) • Zero as the identity element (e.g., $7+0=7$) • Associative (e.g., $7+3+2$ can be found by first adding either $7+3$ or $3+2$) 	<p>Instructor’s Guide: n/a</p>

Standard 4.4

Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>A. Data Analysis (or Statistics)</i></p> <p>1. Collect, generate, record, and organize data in response to questions, claims, or curiosity.</p> <ul style="list-style-type: none"> • Data collected from students' everyday experiences • Data generated from chance devices, such as spinners and dice 	<p>Instructor's Guide: n/a</p>
<p>2. Read, interpret, construct, and analyze displays of data.</p> <ul style="list-style-type: none"> • Pictures, tally chart, pictograph, bar graph, Venn diagram • Smallest to largest, most frequent (mode) 	<p>Instructor's Guide: 93</p>
<p><i>B. Probability</i></p> <p>1. Use chance devices like spinners and dice to explore concepts of probability.</p> <ul style="list-style-type: none"> • Certain, impossible • More likely, less likely, equally likely 	<p>Instructor's Guide: n/a</p>
<p>2. Provide probability of specific outcomes.</p> <ul style="list-style-type: none"> • Probability of getting specific outcome when coin is tossed, when die is rolled, when spinner is spun (e.g., if spinner has five equal sectors, then probability of getting a particular sector is one out of five) • When picking a marble from a bag with three red marbles and four blue marbles, the probability of getting a red marble is three out of seven. 	<p>Instructor's Guide: n/a</p>
<p><i>C. Discrete Mathematics-Systematic Listing and Counting</i></p> <p>1. Sort and classify objects according to attributes.</p> <ul style="list-style-type: none"> • Venn diagrams 	<p>Instructor's Guide: 1, 6, 11, 13, 16, 21, 25, 26, 31, 36, 41, 46, 51, 52, 53, 56, 61, 66, 71, 73, 76, 81, 83, 84, 86, 91, 96, 101, 106, 111, 116, 147</p>
<p>2. Generate all possibilities in simple counting situations (e.g., all outfits involving two shirts and three pants).</p>	<p>Instructor's Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p> <p>1. Follow simple sets of directions (e.g., from one location to another, or from a recipe)</p>	Instructor’s Guide: n/a
<p>2. Color simple maps with a small number of colors.</p>	Instructor’s Guide: n/a
<p>3. Play simple two-person games (e.g., tic-tac-toe) and informally explore the idea of what the outcome should be.</p>	Instructor’s Guide: n/a
<p>4. Explore concrete models of vertex-edge graphs (e.g., vertices are “islands” and edges are “bridges”)</p> <ul style="list-style-type: none"> • Paths from one vertex to another 	Instructor’s Guide: n/a

Standard 4.5
Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	Instructor’s Guide: n/a
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	Instructor’s Guide: n/a
<p>4. Pose problems of various types and levels of difficulty.</p>	Instructor’s Guide: The opportunity to address this objective is available throughout the text.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
5. Monitor their progress and reflect on the process of their problem solving activity.	Instructor's Guide: n/a
<p data-bbox="180 285 391 312"><i>B. Communication</i></p> <p data-bbox="180 348 756 470">1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> <li data-bbox="285 411 553 438">• Reading and writing <li data-bbox="285 443 740 470">• Discussion, listening, and questioning 	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Analyze and evaluate the mathematical thinking and strategies of others.	Instructor's Guide: n/a
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
<p data-bbox="180 936 355 963"><i>C. Connections</i></p> <p data-bbox="180 999 756 1083">1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).</p>	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
4. Apply mathematics in practical situations and in other disciplines.	Instructor's Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor's Guide: n/a
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
<p><i>D. Reasoning</i></p> <p>1. Recognize that mathematical facts, procedures, and claims must be justified.</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Use reasoning to support their mathematical conclusions and problem solutions.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>3. Select and use various types of reasoning and methods of proof.</p>	<p>Instructor’s Guide: n/a</p>
<p>4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>5. Make and investigate mathematical conjectures.</p> <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	<p>Instructor’s Guide: n/a</p>
<p>6. Evaluate examples of mathematical reasoning and determine whether they are valid.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>E. Representations</i></p> <p>1. Create and use representations to organize, record, and communicate mathematical ideas.</p> <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	<p>Instructor’s Guide: 4, 5, 14, 19, 24, 29, 34, 35, 39, 44, 49, 54, 59, 64, 68, 69, 74, 79, 80, 89, 94, 99, 105, 110, 114, 119, 124, 129, 139, 144, 149, 154, 155, 159</p>
<p>2. Select, apply, and translate among mathematical representations to solve problems.</p>	<p>Instructor’s Guide: n/a</p>
<p>3. Use representations to model and interpret physical, social, and mathematical phenomena.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>F. Technology</i></p> <p>1. Use technology to gather, analyze, and communicate mathematical information.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Kindergarten
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.	Instructor's Guide: n/a
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	Instructor's Guide: n/a
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions)	Instructor's Guide: n/a
5. Use computer software to make and verify conjectures about geometric objects.	Instructor's Guide: n/a
6. Use computer-based laboratory technology for mathematical applications in the sciences.	Instructor's Guide: n/a



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Grade 2

Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>A. Number Sense</i></p> <p>1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 2 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • Whole numbers through hundreds • Ordinals • Proper fractions (denominators of 2, 3, 4, 8, 10) 	<p>Instructor's Guide: 2, 4, 5, 14, 17, 19, 22, 27, 25, 27, 28, 32, 37, 44, 45, 49, 65, 85, 105, 117, 118, 154, 173</p>
<p>2. Demonstrate an understanding of whole number place value concepts.</p>	<p>Instructor's Guide: 112, 123, 126, 138, 157, 165, 168</p>
<p>3. Understand that numbers have a variety of uses.</p>	<p>Instructor's Guide: The opportunity to address this objective is available throughout the text.</p>
<p>4. Count and perform simple computations with coins.</p> <ul style="list-style-type: none"> • Amounts up to \$1.00 (using cents notation) 	<p>Instructor's Guide: 29, 34, 39, 64, 73, 74, 76, 77, 78, 79, 94, 96, 102, 109, 124, 128, 139, 149, 151, 152, 155, 164, 169</p>
<p>5. Compare and order whole numbers.</p>	<p>Instructor's Guide: 7, 9, 14, 19, 44, 49, 52, 67, 82, 97, 105, 154, 157</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>B. Numerical Operations</i></p> <p>1. Develop the meaning of addition and subtraction by concretely modeling and discussing a large variety of problems.</p> <ul style="list-style-type: none"> • Joining, separating, and comparing 	<p>Instructor’s Guide: 24, 30, 50, 54, 59, 62, 69, 70, 72, 74, 79, 84, 87, 89, 91, 92, 94, 99, 104, 107, 109, 110, 114, 119, 122, 124, 129, 130, 134, 137, 139, 142, 144, 149, 150, 151, 159, 162, 164, 167, 169, 170, 177</p>
<p>2. Explore the meanings of multiplication and division by modeling and discussing problems.</p>	<p>Instructor’s Guide: n/a</p>
<p>3. Develop proficiency with basic addition and subtraction number facts using a variety of fact strategies (such as “counting on” and “near doubles”) and then commit them to memory.</p>	<p>Instructor’s Guide: 54, 79, 84, 86, 87, 91, 99, 104, 107, 114, 119, 122, 129, 130, 134, 137, 142, 144, 150, 159, 167, 169, 170, 177</p>
<p>4. Construct, use and explain procedures for performing addition and subtraction calculations with:</p> <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	<p>Instructor’s Guide: 10, 24, 30, 50, 62, 69, 72, 79, 104, 114</p>
<p>5. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.</p> <ul style="list-style-type: none"> • Addition of 2-digit numbers • Subtraction of 2-digit numbers 	<p>Instructor’s Guide: n/a</p>
<p>6. Select pencil-and-paper, mental math or a calculator as the appropriate computational method depending on the context and numbers.</p>	<p>Instructor’s Guide: n/a</p>
<p>7. Check the reasonableness of the results of computations.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 10, 24, 30, 50, 62, 69, 72, 79, 104, 114</p>
<p>8. Understand and use the inverse relationship between addition and subtraction.</p>	<p>Instructor’s Guide: 122, 137, 142, 159, 164, 167, 169, 177</p>
<p><i>C. Estimation</i></p> <p>1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 2, 4, 5, 14, 17, 19, 22, 27, 25, 27, 28, 32, 37, 44, 45, 49, 65, 85, 105, 117, 118, 154, 173</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
2. Determine the reasonableness of an answer by estimating the result of computations (e.g., 15 + 16 is not 211).	Instructor's Guide: n/a
3. Explore a variety of strategies for estimation both quantities (e.g., the number of marbles in a jar) and results of computation.	Instructor's Guide: n/a

Standard 4.2 Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>A. Geometric Properties</i></p> <p>1. Identify and describe spatial relationships among objects in space and their relative shapes and sizes.</p> <ul style="list-style-type: none"> • Inside/outside, left/right, above/below, between • Small/larger/same size, wider/narrower, longer/shorter • Congruence (i.e., same size and shape) 	Instructor's Guide: 20, 38, 40
<p>2. Use concrete objects, drawings, and computer graphics to identify, classify, and describe standard three-dimensional and two-dimensional shapes.</p> <ul style="list-style-type: none"> • Vertex, edge, face, side • 3D figures-cub, rectangular prism, sphere, cone, cylinder, and pyramid • 2D figures-square, rectangle, circle, triangle • Relationships between three- and two-dimensional shapes (i.e., the face of a 3D shape is a 2D shape) 	Instructor's Guide: 3, 8, 12, 13, 18, 21, 23, 48, 53, 58, 60, 80, 100, 120, 132, 140, 153, 158, 160, 180
<p>3. Describe, identify and create instances of line symmetry.</p>	Instructor's Guide: n/a
<p>4. Recognize, describe, extend and create designs and patterns with geometric objects of different shapes and colors.</p>	Instructor's Guide: 11, 16, 26, 31, 36, 41, 46, 51, 56, 61, 66

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>B. Transforming Shapes</i></p> <p>1. Use simple shapes to make designs, patterns, and pictures.</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Combine and subdivide simple shapes to make other shapes.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>C. Coordinate Geometry</i></p> <p>1. Give and follow directions for getting from one point to another on a map or grid.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>D. Units of Measurement</i></p> <p>1. Directly compare and order objects according to measurable attributes.</p> <ul style="list-style-type: none"> • Attributes-length, weight, capacity, time, temperature 	<p>Instructor’s Guide: 15, 33, 42, 95, 115</p>
<p>2. Recognize the need for a uniform unit of measure.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 6, 15, 35, 38, 43, 47, 55, 57, 88, 93, 95, 98, 103, 115, 127, 133, 135, 143, 147, 148, 175, 178</p>
<p>3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real-life problems.</p> <ul style="list-style-type: none"> • Length-inch, foot, yard, centimeter, meter • Weight-pound, gram, kilogram • Capacity-pint, quart, liter • Time-second, minute, hour, day, week, month, year • Temperature-degrees Celsius, degrees Fahrenheit 	<p>Instructor’s Guide: 6, 15, 35, 38, 43, 47, 55, 57, 88, 93, 95, 98, 103, 115, 127, 133, 135, 143, 147, 148, 175, 178</p>
<p>4. Estimate measures.</p>	<p>Instructor’s Guide: 133</p>
<p><i>E. Measuring Geometric Objects</i></p> <p>1. Directly measure the perimeter of simple two-dimensional shapes.</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Directly measure the area of simple two-dimensional shapes by covering them with squares.</p>	<p>Instructor’s Guide: n/a</p>

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>A. Patterns</i></p> <p>1. Recognize, describe, extend, and create patterns.</p> <ul style="list-style-type: none"> • Using concrete materials (manipulatives), pictures, rhythms, & whole numbers • Descriptions using words and symbols (e.g., “add tow” or “+2”) • Repeating patterns • Whole number patterns that grow or shrink as a result of repeatedly adding or subtracting a fixed number (e.g., skip counting forward or backward) 	<p>Instructor’s Guide: 11, 16, 26, 31, 36, 41, 46, 51, 56, 61, 66, 71, 76, 81, 86, 91, 96, 101, 106, 111, 113, 116, 125, 126, 131, 136, 141, 145, 146, 156, 161, 170, 172, 176</p>
<p><i>B. Functions and Relationships</i></p> <p>1. Use concrete and pictorial models of function machines to explore the basic concept of a function.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>C. Modeling</i></p> <p>1. Recognize and describe changes over time (e.g., temperature, height).</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Construct and solve simple open sentences involving addition or subtraction.</p> <ul style="list-style-type: none"> • Result unknown (e.g., $6-2=$__ or $n=3+5$) • Part unknown (e.g., $3+$__=8) 	<p>Instructor’s Guide: 30, 50, 62, 72, 92, 107, 122, 137, 142</p>
<p><i>D. Procedures</i></p> <p>1. Understand and apply (but don’t name)the following properties of addition:</p> <ul style="list-style-type: none"> • Commutative (e.g., $5+3=3+5$) • Zero as the identity element (e.g., $7+0=7$) • Associative (e.g., $7+3+2$ can be found by first adding either $7+3$ or $3+2$) 	<p>Instructor’s Guide: 86, 91, 166</p>

Standard 4.4
Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>A. Data Analysis (or Statistics)</i></p> <p>1. Collect, generate, record, and organize data in response to questions, claims, or curiosity.</p> <ul style="list-style-type: none"> • Data collected from students' everyday experiences • Data generated from chance devices, such as spinners and dice 	Instructor's Guide: n/a
<p>2. Read, interpret, construct, and analyze displays of data.</p> <ul style="list-style-type: none"> • Pictures, tally chart, pictograph, bar graph, Venn diagram • Smallest to largest, most frequent (mode) 	Instructor's Guide: 163
<p><i>B. Probability</i></p> <p>1. Use chance devices like spinners and dice to explore concepts of probability.</p> <ul style="list-style-type: none"> • Certain, impossible • More likely, less likely, equally likely 	Instructor's Guide: n/a
<p>2. Provide probability of specific outcomes.</p> <ul style="list-style-type: none"> • Probability of getting specific outcome when coin is tossed, when die is rolled, when spinner is spun (e.g., if spinner has five equal sectors, then probability of getting a particular sector is one out of five) • When picking a marble from a bag with three red marbles and four blue marbles, the probability of getting a red marble is three out of seven. 	Instructor's Guide: n/a
<p><i>C. Discrete Mathematics-Systematic Listing and Counting</i></p> <p>1. Sort and classify objects according to attributes.</p> <ul style="list-style-type: none"> • Venn diagrams 	Instructor's Guide: 1, 6, 21
<p>2. Generate all possibilities in simple counting situations (e.g., all outfits involving two shirts and three pants).</p>	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p> <p>1. Follow simple sets of directions (e.g., from one location to another, or from a recipe)</p>	Instructor’s Guide: n/a
<p>2. Color simple maps with a small number of colors.</p>	Instructor’s Guide: n/a
<p>3. Play simple two-person games (e.g., tic-tac-toe) and informally explore the idea of what the outcome should be.</p>	Instructor’s Guide: n/a
<p>4. Explore concrete models of vertex-edge graphs (e.g., vertices are “islands” and edges are “bridges”)</p> <ul style="list-style-type: none"> • Paths from one vertex to another 	Instructor’s Guide: n/a

Standard 4.5
Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	Instructor’s Guide: 10, 70, 90
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	Instructor’s Guide: 10, 70, 90
<p>4. Pose problems of various types and levels of difficulty.</p>	Instructor’s Guide: The opportunity to address this objective is available throughout the text.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
5. Monitor their progress and reflect on the process of their problem solving activity.	Instructor's Guide: n/a
<p data-bbox="180 285 391 315"><i>B. Communication</i></p> <p data-bbox="180 348 756 470">1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> <li data-bbox="285 411 553 441">• Reading and writing <li data-bbox="285 443 740 470">• Discussion, listening, and questioning 	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Analyze and evaluate the mathematical thinking and strategies of others.	Instructor's Guide: n/a
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
<p data-bbox="180 936 355 966"><i>C. Connections</i></p> <p data-bbox="180 999 756 1083">1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).</p>	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
4. Apply mathematics in practical situations and in other disciplines.	Instructor's Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor's Guide: n/a
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
<p><i>D. Reasoning</i></p> <p>1. Recognize that mathematical facts, procedures, and claims must be justified.</p>	<p>Instructor’s Guide: 10, 70, 90</p>
<p>2. Use reasoning to support their mathematical conclusions and problem solutions.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>3. Select and use various types of reasoning and methods of proof.</p>	<p>Instructor’s Guide: n/a</p>
<p>4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>5. Make and investigate mathematical conjectures.</p> <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	<p>Instructor’s Guide: n/a</p>
<p>6. Evaluate examples of mathematical reasoning and determine whether they are valid.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>E. Representations</i></p> <p>1. Create and use representations to organize, record, and communicate mathematical ideas.</p> <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	<p>Instructor’s Guide: 2, 4, 5, 9, 14, 17, 19, 22, 32, 37, 59, 65, 72, 74, 85, 87, 107, 112, 117, 118, 123, 138, 173</p>
<p>2. Select, apply, and translate among mathematical representations to solve problems.</p>	<p>Instructor’s Guide: n/a</p>
<p>3. Use representations to model and interpret physical, social, and mathematical phenomena.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>F. Technology</i></p> <p>1. Use technology to gather, analyze, and communicate mathematical information.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 1
2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.	Instructor's Guide: n/a
3. Use graphing calculators and computer software to investigate properties of functions and their graphs.	Instructor's Guide: n/a
4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions)	Instructor's Guide: n/a
5. Use computer software to make and verify conjectures about geometric objects.	Instructor's Guide: n/a
6. Use computer-based laboratory technology for mathematical applications in the sciences.	Instructor's Guide: n/a

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 correlated to
New Jersey Mathematics
Academic & Professional Standards
Grade 2

Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>A. Number Sense</i></p> <p>1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 2 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • Whole numbers through hundreds • Ordinals • Proper fractions (denominators of 2, 3, 4, 8, 10) 	<p>Instructor's Guide: 2, 5, 48, 57, 60, 80, 90, 92, 97, 122, 138, 147, 180</p>
<p>2. Demonstrate an understanding of whole number place value concepts.</p>	<p>Instructor's Guide: 36, 40, 60, 81, 90, 122, 123, 132, 146</p>
<p>3. Understand that numbers have a variety of uses.</p>	<p>Instructor's Guide: The opportunity to address this objective is available throughout the text.</p>
<p>4. Count and perform simple computations with coins.</p> <ul style="list-style-type: none"> • Amounts up to \$1.00 (using cents notation) 	<p>Instructor's Guide: 16, 32, 33, 59, 77, 86, 100, 103, 118, 119, 140, 141, 144, 152, 159, 161</p>
<p>5. Compare and order whole numbers.</p>	<p>Instructor's Guide: 17, 31, 51, 121</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>B. Numerical Operations</i></p> <p>1. Develop the meaning of addition and subtraction by concretely modeling and discussing a large variety of problems.</p> <ul style="list-style-type: none"> • Joining, separating, and comparing 	<p>Instructor’s Guide: 12, 16, 27, 42, 62</p>
<p>2. Explore the meanings of multiplication and division by modeling and discussing problems.</p>	<p>Instructor’s Guide: 73, 81, 86, 97, 110, 111, 112, 113, 120, 124, 128, 135, 136, 139, 141, 141, 165, 170, 174, 178, 179</p>
<p>3. Develop proficiency with basic addition and subtraction number facts using a variety of fact strategies (such as “counting on” and “near doubles”) and then commit them to memory.</p>	<p>Instructor’s Guide: 4, 5, 9, 12, 14, 19, 22, 24, 27, 29, 33, 39, 42, 44, 49, 54, 64, 72, 74, 79, 84, 87, 89, 94, 99, 102, 104, 107, 109, 114, 129, 134, 158, 169</p>
<p>4. Construct, use and explain procedures for performing addition and subtraction calculations with:</p> <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	<p>Instructor’s Guide: 22, 36, 37, 49, 54, 61, 65, 67, 69, 72, 74, 87, 96, 116, 117, 127, 129, 137, 143</p>
<p>5. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.</p> <ul style="list-style-type: none"> • Addition of 2-digit numbers • Subtraction of 2-digit numbers 	<p>Instructor’s Guide: 61, 96, 117, 127, 137, 143, 146, 164, 166, 176</p>
<p>6. Select pencil-and-paper, mental math or a calculator as the appropriate computational method depending on the context and numbers.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 22, 36, 37, 49, 54, 61, 65, 67, 69, 72, 74, 87, 96, 116, 117, 127, 129, 137, 143</p>
<p>7. Check the reasonableness of the results of computations.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 22, 36, 37, 49, 54, 61, 65, 67, 69, 72, 74, 87, 96, 116, 117, 127, 129, 137, 143</p>
<p>8. Understand and use the inverse relationship between addition and subtraction.</p>	<p>Instructor’s Guide: 33, 42, 102</p>
<p><i>C. Estimation</i></p> <p>1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 2, 5, 48, 57, 60, 80, 90, 92, 97, 122, 138, 147, 180</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
2. Determine the reasonableness of an answer by estimating the result of computations (e.g., $15 + 16$ is not 211).	Instructor's Guide: n/a
3. Explore a variety of strategies for estimation both quantities (e.g., the number of marbles in a jar) and results of computation.	Instructor's Guide: n/a

Standard 4.2 Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>A. Geometric Properties</i></p> <p>1. Identify and describe spatial relationships among objects in space and their relative shapes and sizes.</p> <ul style="list-style-type: none"> • Inside/outside, left/right, above/below, between • Small/larger/same size, wider/narrower, longer/shorter • Congruence (i.e., same size and shape) 	Instructor's Guide: 75
<p>2. Use concrete objects, drawings, and computer graphics to identify, classify, and describe standard three-dimensional and two-dimensional shapes.</p> <ul style="list-style-type: none"> • Vertex, edge, face, side • 3D figures-cub, rectangular prism, sphere, cone, cylinder, and pyramid • 2D figures-square, rectangle, circle, triangle • Relationships between three- and two-dimensional shapes (i.e., the face of a 3D shape is a 2D shape) 	Instructor's Guide: 3, 13, 23, 35, 38, 52, 62, 78, 88, 98, 125, 133, 163, 173, 175
<p>3. Describe, identify and create instances of line symmetry.</p>	Instructor's Guide: 153
<p>4. Recognize, describe, extend and create designs and patterns with geometric objects of different shapes and colors.</p>	Instructor's Guide: 6, 11, 66, 126

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>B. Transforming Shapes</i></p> <p>1. Use simple shapes to make designs, patterns, and pictures.</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Combine and subdivide simple shapes to make other shapes.</p>	<p>Instructor’s Guide: 115</p>
<p><i>C. Coordinate Geometry</i></p> <p>1. Give and follow directions for getting from one point to another on a map or grid.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>D. Units of Measurement</i></p> <p>1. Directly compare and order objects according to measurable attributes.</p> <ul style="list-style-type: none"> • Attributes-length, weight, capacity, time, temperature 	<p>Instructor’s Guide: 149</p>
<p>2. Recognize the need for a uniform unit of measure.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 7, 8, 20, 28, 30, 43, 45, 47, 50, 62, 83, 85, 93, 108, 150, 160, 168</p>
<p>3. Select and use appropriate standard and non-standard units of measure and standard measurement tools to solve real-life problems.</p> <ul style="list-style-type: none"> • Length-inch, foot, yard, centimeter, meter • Weight-pound, gram, kilogram • Capacity-pint, quart, liter • Time-second, minute, hour, day, week, month, year • Temperature-degrees Celsius, degrees Fahrenheit 	<p>Instructor’s Guide: 7, 8, 20, 28, 30, 43, 47, 50, 58, 62, 82, 83, 85, 93, 108, 150, 160, 168</p>
<p>4. Estimate measures.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>E. Measuring Geometric Objects</i></p> <p>1. Directly measure the perimeter of simple two-dimensional shapes.</p>	<p>Instructor’s Guide: 68, 105</p>
<p>2. Directly measure the area of simple two-dimensional shapes by covering them with squares.</p>	<p>Instructor’s Guide: 53</p>

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>A. Patterns</i></p> <p>1. Recognize, describe, extend, and create patterns.</p> <ul style="list-style-type: none"> • Using concrete materials (manipulatives), pictures, rhythms, & whole numbers • Descriptions using words and symbols (e.g., “add tow” or “+2”) • Repeating patterns • Whole number patterns that grow or shrink as a result of repeatedly adding or subtracting a fixed number (e.g., skip counting forward or backward) 	<p>Instructor’s Guide: 1, 6, 11, 21, 26, 41, 46, 51, 56, 66, 71, 76, 81, 91, 10,1 106, 126, 131, 141, 171</p>
<p><i>B. Functions and Relationships</i></p> <p>1. Use concrete and pictorial models of function machines to explore the basic concept of a function.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>C. Modeling</i></p> <p>1. Recognize and describe changes over time (e.g., temperature, height).</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Construct and solve simple open sentences involving addition or subtraction.</p> <ul style="list-style-type: none"> • Result unknown (e.g., $6-2=$__ or $n=3+5$) • Part unknown (e.g., $3+$__=8) 	<p>Instructor’s Guide: 127, 135, 155</p>
<p><i>D. Procedures</i></p> <p>1. Understand and apply (but don’t name)the following properties of addition:</p> <ul style="list-style-type: none"> • Commutative (e.g., $5+3=3+5$) • Zero as the identity element (e.g., $7+0=7$) • Associative (e.g., $7+3+2$ can be found by first adding either $7+3$ or $3+2$) 	<p>Instructor’s Guide: 136</p>

Standard 4.4
Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>A. Data Analysis (or Statistics)</i></p> <p>1. Collect, generate, record, and organize data in response to questions, claims, or curiosity.</p> <ul style="list-style-type: none"> • Data collected from students' everyday experiences • Data generated from chance devices, such as spinners and dice 	<p>Instructor's Guide: n/a</p>
<p>2. Read, interpret, construct, and analyze displays of data.</p> <ul style="list-style-type: none"> • Pictures, tally chart, pictograph, bar graph, Venn diagram • Smallest to largest, most frequent (mode) 	<p>Instructor's Guide: 25, 70, 155</p>
<p><i>B. Probability</i></p> <p>1. Use chance devices like spinners and dice to explore concepts of probability.</p> <ul style="list-style-type: none"> • Certain, impossible • More likely, less likely, equally likely 	<p>Instructor's Guide: n/a</p>
<p>2. Provide probability of specific outcomes.</p> <ul style="list-style-type: none"> • Probability of getting specific outcome when coin is tossed, when die is rolled, when spinner is spun (e.g., if spinner has five equal sectors, then probability of getting a particular sector is one out of five) • When picking a marble from a bag with three red marbles and four blue marbles, the probability of getting a red marble is three out of seven. 	<p>Instructor's Guide: n/a</p>
<p><i>C. Discrete Mathematics-Systematic Listing and Counting</i></p> <p>1. Sort and classify objects according to attributes.</p> <ul style="list-style-type: none"> • Venn diagrams 	<p>Instructor's Guide: n/a</p>
<p>2. Generate all possibilities in simple counting situations (e.g., all outfits involving two shirts and three pants).</p>	<p>Instructor's Guide: 161</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p> <p>1. Follow simple sets of directions (e.g., from one location to another, or from a recipe)</p>	Instructor’s Guide: n/a
<p>2. Color simple maps with a small number of colors.</p>	Instructor’s Guide: n/a
<p>3. Play simple two-person games (e.g., tic-tac-toe) and informally explore the idea of what the outcome should be.</p>	Instructor’s Guide: n/a
<p>4. Explore concrete models of vertex-edge graphs (e.g., vertices are “islands” and edges are “bridges”)</p> <ul style="list-style-type: none"> • Paths from one vertex to another 	Instructor’s Guide: n/a

Standard 4.5
Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
4. Pose problems of various types and levels of difficulty.	Instructor's Guide: 5, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175
5. Monitor their progress and reflect on the process of their problem solving activity.	Instructor's Guide: n/a
<i>B. Communication</i> 1. Use communication to organize and clarify their mathematical thinking. <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Analyze and evaluate the mathematical thinking and strategies of others.	Instructor's Guide: n/a
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
<i>C. Connections</i> 1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
4. Apply mathematics in practical situations and in other disciplines.	Instructor's Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
<i>D. Reasoning</i> 1. Recognize that mathematical facts, procedures, and claims must be justified.	Instructor's Guide: n/a
2. Use reasoning to support their mathematical conclusions and problem solutions.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Select and use various types of reasoning and methods of proof.	Instructor's Guide: n/a
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
5. Make and investigate mathematical conjectures. <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	Instructor's Guide: n/a
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Instructor's Guide: n/a
<i>E. Representations</i> 1. Create and use representations to organize, record, and communicate mathematical ideas. <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	Instructor's Guide: 2, 16, 40, 42, 47, 48, 57, 58, 68, 80, 92, 113, 128, 135, 136, 153, 170
2. Select, apply, and translate among mathematical representations to solve problems.	Instructor's Guide: n/a
3. Use representations to model and interpret physical, social, and mathematical phenomena.	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 2
<p><i>F. Technology</i></p> <p>1. Use technology to gather, analyze, and communicate mathematical information.</p>	<p>Instructor’s Guide: n/a</p>
<p>2. Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.</p>	<p>Instructor’s Guide: n/a</p>
<p>3. Use graphing calculators and computer software to investigate properties of functions and their graphs.</p>	<p>Instructor’s Guide: n/a</p>
<p>4. Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions)</p>	<p>Instructor’s Guide: n/a</p>
<p>5. Use computer software to make and verify conjectures about geometric objects.</p>	<p>Instructor’s Guide: n/a</p>
<p>6. Use computer-based laboratory technology for mathematical applications in the sciences.</p>	<p>Instructor’s Guide: n/a</p>



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Grade 3

S t a n d a r d 4 . 1
N u m b e r a n d N u m e r i c a l O p e r a t i o n s

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
<p><i>A. Number Sense</i></p> <p>1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 3 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • Whole numbers through hundred thousands • Commonly used fractions (denominators of 2, 3, 4, 5, 6, 8, 10) as part of a whole, as a subset of a set, and as a location on a number line 	<p>Instructor’s Guide: 18, 48, 82, 83, 137, 140, 145</p>
<p>2. Demonstrate an understanding of whole number place value concepts.</p>	<p>Instructor’s Guide: 5, 7, 35, 48, 60, 71, 103, 127, 140, 153, 180</p>
<p>3. Identify whether any whole number is odd or even.</p>	<p>Instructor’s Guide: 18, 29, 76, 81, 115, 179, 180</p>
<p>4. Explore the extension of the place value system to decimals through hundredths.</p>	<p>Instructor’s Guide: n/a</p>
<p>5. Understand the various uses of numbers.</p> <ul style="list-style-type: none"> • Counting, measuring, labeling (e.g., numbers on baseball uniforms) 	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
6. Compare and order whole numbers.	Instructor’s Guide: 18, 145
<p><i>B. Numerical Operations</i></p> <p>1. Develop the meaning of the four basic arithmetic operations by modeling and discussing a large variety of problems.</p> <ul style="list-style-type: none"> • Addition and subtraction: joining, separating, comparing • Multiplication: repeated addition, area/array • Division: repeated subtraction, sharing 	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 2, 4, 7, 8, 9, 11, 14, 16, 19, 23, 24, 29, 31, 33, 34, 36, 37, 39, 41, 46, 47, 49, 53, 56, 62, 64, 68, 74, 79, 85, 89, 90, 92, 97, 104, 112, 120, 124, 130, 134, 137, 139, 146, 147, 149, 150, 151, 154, 155, 163, 175</p>
2. Develop proficiency with basic multiplication and division number facts using a variety of fact strategies (such as “skip counting” and “repeated subtraction”).	Instructor’s Guide: 47, 64, 69, 77, 79, 84, 86, 89, 97, 102, 124, 129, 147, 149, 154, 164, 171, 173, 174, 175, 179
<p>3. Construct, use and explain procedures for performing whole number calculations with:</p> <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	Instructor’s Guide: 4, 7, 6, 10, 11, 12, 14, 16, 19, 24, 26, 31, 34, 36, 37, 39, 40, 41, 46, 49, 56, 68, 75, 94, 105, 130, 134, 139, 141, 144, 146, 151, 154, 163, 164, 170
<p>4. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers.</p> <ul style="list-style-type: none"> • Addition of 3-digit numbers • Subtraction of 3-digit numbers • Multiplication of 2-digit numbers by 1-digit numbers 	Instructor’s Guide: 10, 40, 105, 170
<p>5. Count and perform simple computations with money.</p> <ul style="list-style-type: none"> • Cents notation (¢) 	Instructor’s Guide: 1, 32, 44, 73, 78, 95, 117, 147, 168, 169
6. Select pencil-and-paper, mental math or a calculator as the appropriate computational method depending on the context and numbers.	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 10, 40, 75, 105, 170</p>
7. Check the reasonableness of the results of computations.	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 4, 7, 6, 10, 11, 12, 14, 16, 19, 24, 26, 31, 34, 36, 37, 39, 40, 41, 46, 49, 56, 68, 75, 94, 105, 130, 134, 139, 141, 144, 146, 151, 154, 163, 164, 170</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
<p><i>C. Estimation</i></p> <p>1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.</p>	Instructor’s Guide: 55
<p>2. Construct and use a variety of estimation strategies (e.g., rounding and mental math) for estimating both quantities and the result of computations.</p>	Instructor’s Guide: 40, 43, 70, 75, 105, 122, 158
<p>3. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.</p>	The opportunity to address this objective is available on the following pages: Instructor’s Guide: 40, 43, 70, 75, 105, 122, 158
<p>4. Use estimation to determine whether the result of a computation (either by calculator or by hand) is reasonable.</p>	The opportunity to address this objective is available on the following pages: Instructor’s Guide: 40, 43, 70, 75, 105, 122, 158

Standard 4.2 Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
<p><i>A. Geometric Properties</i></p> <p>1. Identify and describe spatial relationships of two or more objects in space.</p> <ul style="list-style-type: none"> • Direction, orientation, and perspectives (e.g., which object is on your left when you are standing here) • Relative shapes and sizes 	Instructor’s Guide: n/a
<p>2. Use properties of standard three-dimensional and two-dimensional shapes to identify, classify, and describe them.</p> <ul style="list-style-type: none"> • Vertex, edge, face, side, angle • 3D figures-cube, rectangular prism, sphere, cone, cylinder, and pyramid • 2D figures-square, rectangle, circle, triangle, pentagon, hexagon, octagon 	Instructor’s Guide: 3, 15, 45, 57, 65, 93, 107, 111, 123, 135, 142, 143, 176, 178
<p>4. Identify and describe relationships among two-dimensional shapes.</p> <ul style="list-style-type: none"> • Same size, same shape • Lines of symmetry 	Instructor’s Guide: 28, 57, 108

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
4. Understand and apply concepts involving lines, angles, and circles. <ul style="list-style-type: none"> • Line, line segment, endpoint 	Instructor’s Guide: 57
5. Recognize, describe, extend, and create space-filling patterns.	Instructor’s Guide: 111, 176
<i>B. Transforming Shapes</i> 1. Describe and use geometric transformations (slide, flip, turn).	Instructor’s Guide: 57
2. Investigate the occurrence of geometry in nature and art.	Instructor’s Guide: n/a
<i>C. Coordinate Geometry</i> 1. Locate and name points in the first quadrant on a coordinate grid.	Instructor’s Guide: 165
<i>D. Units of Measurement</i> 1. Understand that everyday objects have a variety of attributes, each of which can be measures in many ways.	The opportunity to address this objective is available on the following pages: Instructor’s Guide: 13, 17, 20, 30, 50, 52, 63, 80, 110, 113, 148, 155, 160, 166
2. Select and use appropriate standard units of measure and measurement tools to solve real-life problems. <ul style="list-style-type: none"> • Length-fractions of an inch ($\frac{1}{4}$, $\frac{1}{2}$), mile, decimeter, kilometer • Area-square inch, square centimeter • Weight-ounce • Capacity-fluid ounce, cup, gallon, milliliter 	Instructor’s Guide: 13, 17, 20, 30, 50, 52, 63, 80, 110, 113, 148, 155, 160, 166
3. Incorporate estimation in measurement activities (e.g., estimate before measuring).	Instructor’s Guide: n/a
<i>E. Measuring Geometric Objects</i> 1. Determine the area of simple two-dimensional shapes on a square grid.	Instructor’s Guide: 27, 133, 161
2. Determine the perimeter of simple shapes by measuring of all of the sides.	Instructor’s Guide: 27, 100, 133, 156

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
3. Measure and compare the volume of three-dimensional objects using materials such as rice or cubes.	Instructor's Guide: n/a

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
<p><i>A. Patterns</i></p> <p>2. Recognize, describe, extend, and create patterns.</p> <ul style="list-style-type: none"> • Descriptions using words and number sentences/expressions • Whole number patterns that grow or shrink as a result of repeatedly adding, subtracting, multiplying by, or dividing by a fixed number (e.g., 5, 8, 11, ... or 800, 400, 200, ...) 	<p>Instructor's Guide: 6, 16, 21, 47, 51, 58, 61, 66, 67, 71, 74, 76, 85, 86, 91, 96, 98, 99, 101, 106, 109, 111, 114, 116, 118, 121, 126, 131, 136, 138, 141, 46, 151, 153, 156, 161, 169</p>
<p><i>B. Functions and Relationships</i></p>	There are no available matches within this section.
<p><i>C. Modeling</i></p>	There are no available matches within this section.
<p><i>D. Procedures</i></p> <p>1. Understand and apply the following properties of operations and numbers:</p> <ul style="list-style-type: none"> • Commutative (e.g., $3 \times 7 = 7 \times 3$) • Identity element for multiplication is 1 (e.g., $1 \times 8 = 8$) • Any number multiplied by zero is zero 	<p>Instructor's Guide: 9, 53, 54, 59, 84</p>
<p>2. Understand and use the concepts of equals, less than, and greater than to describe relations between numbers.</p> <ul style="list-style-type: none"> • Symbols ($=$, $<$, $>$) 	<p>Instructor's Guide: 18, 22</p>

Standard 4.4

Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
<p><i>A. Data Analysis (or Statistics)</i></p> <p>1. Collect, generate, record, and organize data in response to questions, claims, or curiosity.</p> <ul style="list-style-type: none"> • Data collected from the classroom environment 	<p>Instructor’s Guide: n/a</p>
<p>2. Read, interpret, construct, analyze, and generate questions about, and draw inferences from displays of data.</p> <ul style="list-style-type: none"> • Pictograph, bar graph, table 	<p>Instructor’s Guide: 25, 30</p>
<p><i>B. Probability</i></p>	<p>There are no available matches within this section.</p>
<p><i>C. Discrete Mathematics-Systematic Listing and Counting</i></p>	<p>There are no available matches within this section.</p>
<p><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p>	<p>There are no available matches within this section.</p>

Standard 4.5

Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	<p>Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.	Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175
4. Pose problems of various types and levels of difficulty.	Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175
5. Monitor their progress and reflect on the process of their problem solving activity.	Instructor’s Guide: n/a
<i>B. Communication</i> 1. Use communication to organize and clarify their mathematical thinking. <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Analyze and evaluate the mathematical thinking and strategies of others.	Instructor’s Guide: n/a
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<i>C. Connections</i> 1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
4. Apply mathematics in practical situations and in other disciplines.	Instructor’s Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor’s Guide: n/a
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<i>D. Reasoning</i> 1. Recognize that mathematical facts, procedures, and claims must be justified.	Instructor’s Guide: n/a
2. Use reasoning to support their mathematical conclusions and problem solutions.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Select and use various types of reasoning and methods of proof.	Instructor’s Guide: n/a
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
5. Make and investigate mathematical conjectures. <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	Instructor’s Guide: n/a
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Instructor’s Guide: n/a
<i>E. Representations</i> 1. Create and use representations to organize, record, and communicate mathematical ideas. <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	Instructor’s Guide: 6, 8, 18, 23, 57, 69, 77, 82, 90, 108, 115, 121, 133, 136, 137, 145, 146, 147, 150, 151, 156, 161, 168, 173, 175

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 3
2. Select, apply, and translate among mathematical representations to solve problems.	Instructor's Guide: n/a
3. Use representations to model and interpret physical, social, and mathematical phenomena.	Instructor's Guide: n/a
<i>F. Technology</i>	There are no available matches within this section.

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correlated to
New Jersey Mathematics
Academic & Professional Standards
Grade 4

Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<p><i>A. Number Sense</i></p> <p>1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 4 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • Whole numbers through millions • Commonly used fractions (denominators of 2, 3, 4, 5, 6, 8, 10, 12, 16) as part of a whole, as a subset of a set, and as a location on a number line 	<p>Instructor's Guide: 2, 18, 38, 58, 82, 95, 98, 107, 132, 154</p>
<p>2. Demonstrate an understanding of place value concepts.</p>	<p>Instructor's Guide: 22, 27, 62, 95, 97, 103, 112, 133, 143, 147, 173, 174</p>
<p>3. Demonstrate a sense of the relative magnitude of numbers.</p>	<p>Instructor's Guide: n/a</p>
<p>4. Understand the various uses of numbers.</p> <ul style="list-style-type: none"> • Counting, measuring, labeling (e.g., numbers on baseball uniforms), locating (e.g., Room 235 is on the second floor) 	<p>Instructor's Guide: The opportunity to address this objective is available throughout the text.</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
5. Use concrete and pictorial models to relate whole numbers, commonly used fractions, and decimals to each other, and to represent equivalent forms of the same number.	Instructor’s Guide: 113, 120, 133, 144, 145, 150
6. Compare and order whole numbers.	Instructor’s Guide: 12, 175
7. Explore settings that give rise to negative numbers. <ul style="list-style-type: none"> • Temperatures below 0 degrees, debts • Extensions of the number line 	Instructor’s Guide: n/a
<p><i>B. Numerical Operations</i></p> <p>1. Develop the meaning of the four basic arithmetic operations by modeling and discussing a large variety of problems.</p> <ul style="list-style-type: none"> • Addition and subtraction: joining, separating, comparing • Multiplication: repeated addition, area/array • Division: repeated subtraction, sharing 	Instructor’s Guide: 2, 47, 52, 75, 141, 146, 151, 156, 161, 166, 170, 171, 176
2. Develop proficiency with basic multiplication and division number facts using a variety of fact strategies (such as “skip counting” and “repeated subtraction”) and commit them to memory.	Instructor’s Guide: 19, 24, 29, 34, 40, 49, 50, 54, 59, 64, 68, 69, 74, 79, 93, 125, 159
3. Construct, use and explain procedures for performing whole number calculations with: <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	Instructor’s Guide: 1, 4, 6, 9, 11, 14, 23, 43, 44, 65, 75, 77, 84, 93, 97, 117, 119, 124, 125, 129, 134, 139, 141, 142, 146, 151, 156, 159, 161, 164, 166, 170, 171, 176
4. Use efficient and accurate pencil-and-paper procedures for computation with whole numbers. <ul style="list-style-type: none"> • Addition of 3-digit numbers • Subtraction of 3-digit numbers • Multiplication of 2-digit numbers • Division of 3-digit numbers by 1-digit numbers 	Instructor’s Guide: 11, 164
5. Construct and use procedures for performing decimal addition and subtraction.	Instructor’s Guide: n/a
6. Count and perform simple computations with money. <ul style="list-style-type: none"> • Standard dollars and cents notation. 	Instructor’s Guide: 72, 80, 83, 87, 89, 94, 99, 104, 109, 114, 127, 128, 49

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
7. Select pencil-and-paper, mental math or a calculator as the appropriate computational method depending on the context and numbers.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 1, 4, 6, 9, 11, 14, 23, 43, 44, 65, 75, 77, 84, 93, 97, 117, 119, 124, 125, 129, 134, 139, 141, 142, 146, 151, 156, 159, 161, 164, 166, 170, 171, 176
8. Check the reasonableness of the results of computations.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 1, 4, 6, 9, 11, 14, 23, 43, 44, 65, 75, 77, 84, 93, 97, 117, 119, 124, 125, 129, 134, 139, 141, 142, 146, 151, 156, 159, 161, 164, 166, 170, 171, 176
9. Use concrete models to explore addition and subtraction with fractions.	Instructor's Guide: 155, 160
10. Understand and use the inverse relationships between addition and subtraction and between multiplication and division.	Instructor's Guide: 92
<p data-bbox="190 869 337 898"><i>C. Estimation</i></p> <p data-bbox="190 932 787 1020">1. Judge without counting whether a set of objects has less than, more than, or the same number of objects as a reference set.</p>	Instructor's Guide: n/a
2. Construct and use a variety of estimation strategies (e.g., rounding and mental math) for estimating both quantities and the result of computations.	Instructor's Guide: 22, 25, 62, 100, 102, 122, 169, 173, 174, 177, 178, 179
3. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 22, 25, 62, 100, 102, 122, 169, 173, 174, 177, 178, 179
4. Use estimation to determine whether the result of a computation (either by calculator or by hand) is reasonable.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 22, 25, 62, 100, 102, 122, 169, 173, 174, 177, 178, 179

Standard 4.2 Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<p><i>A. Geometric Properties</i></p> <p>1. Identify and describe spatial relationships of two or more objects in space.</p> <ul style="list-style-type: none"> • Direction, orientation, and perspectives (e.g., which object is on your left when you are standing here) • Relative shapes and sizes • Shadows (projections) of everyday objects 	<p>Instructor's Guide: n/a</p>
<p>2. Use properties of standard three-dimensional and two-dimensional shapes to identify, classify, and describe them.</p> <ul style="list-style-type: none"> • Vertex, edge, face, side, angle • 3D figures-cube, rectangular prism, sphere, cone, cylinder, and pyramid • 2D figures-square, rectangle, circle, triangle, pentagon, hexagon, octagon • Inclusive relationships-squares are rectangles, cubes are rectangular prisms 	<p>Instructor's Guide: 3, 28, 60, 110, 137, 158</p>
<p>3. Identify and describe relationships among two-dimensional shapes.</p> <ul style="list-style-type: none"> • Congruence • Lines of symmetry 	<p>Instructor's Guide: 63, 158</p>
<p>4. Understand and apply concepts involving lines, angles, and circles.</p> <ul style="list-style-type: none"> • Point, line, line segment, endpoint • Parallel, perpendicular • Angles-acute, right, obtuse • Circles-diameter, radius, center 	<p>Instructor's Guide: 85, 153, 158</p>
<p>5. Recognize, describe, extend, and create space-filling patterns.</p>	<p>Instructor's Guide: n/a</p>
<p><i>B. Transforming Shapes</i></p> <p>1. Use simple shapes to cover an area (tessellations).</p>	<p>Instructor's Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
2. Describe and use geometric transformations (slide, flip, turn)	Instructor's Guide: 163
3. Investigate the occurrence of geometry in nature and art.	Instructor's Guide: n/a
<i>C. Coordinate Geometry</i> 1. Locate and name points in the first quadrant on a coordinate grid.	Instructor's Guide: 135
2. Use coordinates to give or follow directions from one point to another on a map or grid.	Instructor's Guide: n/a
<i>D. Units of Measurement</i> 1. Understand that everyday objects have a variety of attributes, each of which can be measures in many ways.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 5, 8, 30, 33, 55, 73
2. Select and use appropriate standard units of measure and measurement tools to solve real-life problems. <ul style="list-style-type: none"> • Length-fractions of an inch (1/4, 1/2), mile, decimeter, kilometer • Area-square inch, square centimeter • Volume-cubic inch, cubic centimeter • Weight-ounce • Capacity-fluid ounce, cup, gallon, milliliter 	Instructor's Guide: 5, 8, 30, 33, 55, 73
3. Develop and use personal referents to approximate standard units of measure (e.g., a common paper clip is about an inch long).	Instructor's Guide: 73
4. Incorporate estimation in measurement activities (e.g., estimate before measuring).	Instructor's Guide: n/a
5. Solve problems involving elapsed time.	Instructor's Guide: 105, 123, 130
<i>E. Measuring Geometric Objects</i> 1. Determine the area of simple two-dimensional shapes on a square grid.	Instructor's Guide: 88

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
2. Distinguish between perimeter and area and use each appropriately in problem-solving situations.	Instructor's Guide: 10, 35, 53, 137
3. Measure and compare the volume of three-dimensional objects using materials such as rice or cubes.	Instructor's Guide: n/a

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<p><i>A. Patterns</i></p> <p>1. Recognize, describe, extend, and create patterns.</p> <ul style="list-style-type: none"> • Descriptions using words and number sentences/expressions • Whole number patterns that grow or shrink as a result of repeatedly adding, subtracting, multiplying by, or dividing by a fixed number (e.g., 5, 8, 11, ... or 800, 400, 200, ...) • Sequences can often be extended in more than one way (e.g., the next term after 1, 2, 4, ... could be 8, or 7, or ...) 	Instructor's Guide: 7, 21, 31, 36, 41, 46, 51, 61, 65, 91, 96, 136
<p><i>B. Functions and Relationships</i></p> <p>2. Use concrete and pictorial models of function machines to explore the basic concept of a function.</p> <ol style="list-style-type: none"> a. Input/output tables, T-charts b. Combining two function machines c. Reversing a function machine 	Instructor's Guide: 140
<p><i>C. Modeling</i></p> <p>1. Recognize and describe change in quantities.</p> <ul style="list-style-type: none"> • Graphs representing change over time (e.g., temperature, height) • How change in one physical quantity can produce a corresponding change in another (e.g., pitch of a sound depends on the rate of vibration) 	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
2. Construct and solve simple open sentences involving any one operation (e.g., $3x6=_$, $n=15\div5$, $3x_-=0$, $16-c=7$).	Instructor's Guide: 4, 9, 14, 40, 59, 69, 74, 79, 84, 96, 152, 167, 172
<i>D. Procedures</i> 1. Understand, name, and apply the properties of operations and numbers: <ul style="list-style-type: none"> • Commutative (e.g., $3x7=7x3$) • Identity element for multiplication is 1 (e.g., $1x8=8$) • Associative (e.g., $2x4x25$ can be found by first multiplying either $2x4$ or $4x25$) • Division by zero is undefined • Any number multiplied by zero is zero 	Instructor's Guide: 50, 57, 67, 90, 115
2. Understand and use the concepts of equals, less than, and greater than to describe relations between numbers. <ul style="list-style-type: none"> • Symbols ($=$, $<$, $>$) 	Instructor's Guide: 26

Standard 4.4
Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<i>A. Data Analysis (or Statistics)</i>	There are no available matches within this section.
<i>B. Probability</i>	There are no available matches within this section.
<i>C. Discrete Mathematics-Systematic Listing and Counting</i> 1. Represent and classify data according to attributes, such as shape or color, and relationships. <ul style="list-style-type: none"> • Venn diagrams • Numerical and alphabetical order 	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<p>2. Represent all possibilities for a simple counting situation in an organized way and draw conclusions from the representation.</p> <ul style="list-style-type: none"> • Organized lists, charts, tree diagrams • Dividing into categories (e.g., to find the total number of rectangles in a grid, find the number of rectangles of each size and add the results) 	<p>Instructor’s Guide: 31, 91</p>
<p><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p>	<p>There are no available matches within this section.</p>

S t a n d a r d 4 . 5
M a t h e m a t i c a l P r o c e s s e s

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	<p>Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175</p>
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	<p>Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175</p>
<p>4. Pose problems of various types and levels of difficulty.</p>	<p>Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175</p>
<p>5. Monitor their progress and reflect on the process of their problem solving activity.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<p><i>B. Communication</i></p> <p>1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>3. Analyze and evaluate the mathematical thinking and strategies of others.</p>	<p>Instructor’s Guide: n/a</p>
<p>4. Use the language of mathematics to express mathematical ideas precisely.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p><i>C. Connections</i></p> <p>1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>3. Recognize that mathematics is used in a variety of contexts outside of mathematics.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>4. Apply mathematics in practical situations and in other disciplines.</p>	<p>Instructor’s Guide: n/a</p>
<p>5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).</p>	<p>Instructor’s Guide: n/a</p>
<p>6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 4
<p><i>D. Reasoning</i></p> <p>1. Recognize that mathematical facts, procedures, and claims must be justified.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Use reasoning to support their mathematical conclusions and problem solutions.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>3. Select and use various types of reasoning and methods of proof.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>5. Make and investigate mathematical conjectures.</p> <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	<p>Instructor’s Guide: n/a</p>
<p>6. Evaluate examples of mathematical reasoning and determine whether they are valid.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>E. Representations</i></p> <p>1. Create and use representations to organize, record, and communicate mathematical ideas.</p> <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	<p>Instructor’s Guide: 3, 10, 28, 35, 36, 41, 51, 53, 60, 61, 63, 66, 71, 72, 76, 81, 83, 85, 86, 88, 91, 96,, 105, 128, 135, 136, 137, 140, 141145, 146, 151, 153, 156, 158, 161, 162, 163, 166, 170, 171, 176</p>
<p>2. Select, apply, and translate among mathematical representations to solve problems.</p>	<p>Instructor’s Guide: n/a</p>
<p>3. Use representations to model and interpret physical, social, and mathematical phenomena.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>F. Technology</i></p>	<p>There are no available matches within this section.</p>

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Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
<p><i>A. Number Sense</i></p> <p>1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for grade 5 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • All fractions as part of a whole, as subset of a set, as a location on a number line, and as divisions of whole numbers • All decimals 	<p>Instructor's Guide: 65, 95, 167, 172</p>
<p>2. Recognize the decimal nature of United States currency and compute with money.</p>	<p>Instructor's Guide: 109, 112, 113, 134, 154, 172, 179</p>
<p>3. Demonstrate a sense of the relative magnitude of numbers.</p>	<p>Instructor's Guide: n/a</p>
<p>4. Use whole numbers, fractions, and decimals to represent equivalent forms of the same number.</p>	<p>Instructor's Guide: 27, 28, 44, 49, 65, 87, 88, 91, 143, 145, 150, 173, 178</p>
<p>5. Develop and apply number theory concepts in problem solving situations.</p> <ul style="list-style-type: none"> • Primes, factors, multiples 	<p>Instructor's Guide: 1, 6, 7, 11, 16, 18, 21, 26, 31, 36, 37, 41, 45, 48, 58, 67, 70, 96, 99, 101, 120, 168, 180</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
6. Compare and order whole numbers.	Instructor's Guide: 20, 31, 157
<p><i>B. Numerical Operations</i></p> <p>1. Recognize the appropriate use of each arithmetic operation in problem situations.</p>	Instructor's Guide: 32, 42, 112
<p>2. Construct, use and explain procedures for performing addition and subtraction with fractions and decimals with:</p> <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	Instructor's Guide: 47, 54, 89, 104, 125, 129, 133, 144, 155, 160, 169, 174
3. Use efficient and accurate pencil-and-paper procedures for division of a 3-digit number by a 2-digit number.	Instructor's Guide: n/a
4. Select pencil-and-paper, mental math or a calculator as the appropriate computational method depending on the context and numbers.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 47, 54, 89, 104, 125, 129, 133, 144, 155, 160, 169, 174
5. Check the reasonableness of the results of computations.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 47, 54, 89, 104, 125, 129, 133, 144, 155, 160, 169, 174
6. Understand and use the various relationships among operations and properties of operations.	Instructor's Guide: 7, 90, 162
<p><i>C. Estimation</i></p> <p>1. Use a variety of estimation strategies for both number and computation.</p>	Instructor's Guide: 13, 25, 33, 53, 68, 72, 78, 93, 118, 147, 148, 163
2. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 13, 25, 33, 53, 68, 72, 78, 93, 118, 147, 148, 163
3. Determine the reasonableness of an answer by estimating the results of operations.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 13, 25, 33, 53, 68, 72, 78, 93, 118, 147, 148, 163

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
4. Determine whether a given estimate is an overestimate or an underestimate.	Instructor's Guide: 25

Standard 4.2 Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
<p><i>A. Geometric Properties</i></p> <p>1. Understand and apply concepts involving lines and angles.</p> <ul style="list-style-type: none"> • Notation for line, ray, angle, line segment • Properties of parallel, perpendicular, and intersecting lines • Sum of the measures of the interior angles of a triangle is 180 degrees 	Instructor's Guide: 85, 102, 123, 128
<p>2. Identify, describe, compare, and classify polygons.</p> <ul style="list-style-type: none"> • Triangles by angles and sides • Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi • Polygons by number of sides • Equilateral, equiangular, regular • All points equidistant from a given point form a circle 	Instructor's Guide: 22, 35, 105, 110, 115, 138, 140, 153
<p>3. Identify similar figures.</p>	Instructor's Guide: n/a
<p>4. Understand and apply concepts of congruence and symmetry (line and rotational).</p>	Instructor's Guide: n/a
<p>5. Recognize, describe, extend, and create space-filling patterns.</p>	Instructor's Guide: n/a
<p><i>B. Transforming Shapes</i></p>	There are no available matches within this section.
<p><i>C. Coordinate Geometry</i></p>	There are no available matches within this section.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
<p><i>D. Units of Measurement</i></p> <p>1. Select and use appropriate units to measure angles and area.</p>	<p>Instructor's Guide: 123, 128</p>
<p>2. Convert measurement units within a system (e.g., 3 feet = _ inches).</p>	<p>Instructor's Guide: 2, 8, 32, 38, 73, 80, 81, 81, 96, 101, 106, 107, 116, 137</p>
<p>3. Know approximate equivalents between the standard and metric systems (e.g., one kilometer is approximately 6/10 of a mile).</p>	<p>Instructor's Guide: 5, 30</p>
<p>4. Use measurements and estimates to describe and compare phenomena.</p>	<p>Instructor's Guide: n/a</p>
<p><i>E. Measuring Geometric Objects</i></p> <p>1. Use a protractor to measure angles.</p>	<p>Instructor's Guide: 123, 128</p>
<p>2. Develop and apply strategies and formulas for finding perimeter and area.</p> <ul style="list-style-type: none"> • Square • Rectangle 	<p>Instructor's Guide: 3, 23, 43, 63, 83, 103, 127, 141, 171</p>
<p>3. Recognize that rectangles with the same perimeter do not necessarily have the same area and vice versa.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor's Guide: 127, 175</p>
<p>4. Develop informal ways of approximating the measures of familiar objects (e.g., use a grid to approximate the area of the bottom of one's foot).</p>	<p>Instructor's Guide: n/a</p>

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
<p><i>A. Patterns</i></p> <p>1. Recognize, describe, extend, and create patterns involving whole numbers.</p> <ul style="list-style-type: none"> • Descriptions using tables, verbal rules, simple equations, and graph 	<p>Instructor's Guide: 1, 11, 16, 18, 21, 46, 48, 114, 121, 146, 149, 165</p>
<p><i>B. Functions and Relationships</i></p> <p>1. Describe arithmetic operations as functions, including combining operations and reversing them.</p>	<p>Instructor's Guide: 51, 56, 61, 76, 151</p>
<p>2. Graph points satisfying a function from T-charts, from verbal rules, and from simple equations.</p>	<p>Instructor's Guide: n/a</p>
<p><i>C. Modeling</i></p> <p>1. Use number sentences to model situations.</p> <ul style="list-style-type: none"> • Using variables to represent unknown quantities • Using concrete materials, tables, graphs, verbal rules, algebraic expressions/equations 	<p>Instructor's Guide: 4, 9, 17, 40, 57, 76, 176</p>
<p>2. Draw free hand sketches of graphs that model real phenomena and use such graphs to predict and interpret events.</p> <ul style="list-style-type: none"> • Changes over time • Rates of change (e.g., when is plant growing slowly/rapidly, when is temperature dropping most rapidly/slowly) 	<p>Instructor's Guide: 4151, 156</p>
<p><i>D. Procedures</i></p> <p>1. Solve simple linear equations with manipulatives and informally.</p> <ul style="list-style-type: none"> • Whole number coefficients only, answers also whole numbers • Variables on one side of the equation 	<p>Instructor's Guide: 57, 176</p>

Standard 4.4
Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
<p><i>A. Data Analysis (or Statistics)</i></p> <p>1. Collect, generate, record, organize, and display data</p> <ul style="list-style-type: none"> • Data generated from surveys 	<p>Instructor’s Guide: 156, 161, 166</p>
<p>2. Read, interpret, construct, analyze, generate questions about, and draw inferences from displays of data.</p> <ul style="list-style-type: none"> • Bar graph, line graph, circle graph, table • Range, median, and mean 	<p>Instructor’s Guide: 126, 131</p>
<p>3. Respond to questions about data and generate their own questions and hypothesis.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 156, 161, 166</p>
<p><i>B. Probability</i></p>	<p>There are no available matches within this section.</p>
<p><i>C. Discrete Mathematics-Systematic Listing and Counting</i></p> <p>1. Solve counting problems and justify that all possibilities have been enumerated without duplication.</p> <ul style="list-style-type: none"> • Organized lists, charts, tree diagrams, tables 	<p>Instructor’s Guide: 66, 71, 136, 146</p>
<p>2. Explore the multiplication principle of counting in simple situations by representing all possibilities in an organized way (e.g., you can make $3 \times 4 = 12$ outfits using 3 shirts and 4 skirts).</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 66, 71, 136, 146</p>
<p><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p>	<p>There are no available matches within this section.</p>

Standard 4.5

Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	<p>Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175</p>
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	<p>Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175</p>
<p>4. Pose problems of various types and levels of difficulty.</p>	<p>Instructor’s Guide: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 142, 145, 150, 155, 160, 165, 170, 175</p>
<p>5. Monitor their progress and reflect on the process of their problem solving activity.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>B. Communication</i></p> <p>1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>3. Analyze and evaluate the mathematical thinking and strategies of others.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
<p><i>C. Connections</i></p> <p>1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).</p>	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
4. Apply mathematics in practical situations and in other disciplines.	Instructor's Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor's Guide: n/a
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
<p><i>D. Reasoning</i></p> <p>1. Recognize that mathematical facts, procedures, and claims must be justified.</p>	Instructor's Guide: The opportunity to address this objective is available throughout the text.
2. Use reasoning to support their mathematical conclusions and problem solutions.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
3. Select and use various types of reasoning and methods of proof.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	Instructor's Guide: The opportunity to address this objective is available throughout the text.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 5
5. Make and investigate mathematical conjectures. <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	Instructor’s Guide: n/a
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Instructor’s Guide: n/a
<i>E. Representations</i> 1. Create and use representations to organize, record, and communicate mathematical ideas. <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	Instructor’s Guide: 1, 3, 6, 11, 16, 21, 23, 26, 36, 37, 41, 43, 46, 51, 56, 61, 63, 65, 66, 67, 71, 76, 81, 86, 91, 96, 99, 101, 106, 111, 112, 116, 126, 128, 131, 136, 138, 139, 141, 143, 146, 151, 153, 156, 161, 166, 171, 176
2. Select, apply, and translate among mathematical representations to solve problems.	Instructor’s Guide: n/a
3. Use representations to model and interpret physical, social, and mathematical phenomena.	Instructor’s Guide: n/a
<i>F. Technology</i>	There are no available matches within this section.



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Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
<p><i>A. Number Sense</i></p> <p>1. Use real-life experiences, physical materials, and technology to construct meanings for numbers (unless otherwise noted, all indicators for Grade 6 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • All integers • All fractions as part of a whole, as subset of a set, as a location on a number line, and as divisions of whole numbers • All decimals 	<p>Instructor's Guide: 25, 34, 51, 81, 116, 119, 139, 164</p>
<p>2. Recognize the decimal nature of United States currency and compute with money.</p>	<p>Instructor's Guide: 99, 111</p>
<p>3. Demonstrate a sense of the relative magnitude of numbers.</p>	<p>Instructor's Guide: n/a</p>
<p>4. Explore the use of ratios and proportions in a variety of situations.</p>	<p>Instructor's Guide: 100, 105, 106, 110, 142</p>
<p>5. Understand and use whole-number percents between 1 and 100 in a variety of situations.</p>	<p>Instructor's Guide: 104, 120, 131, 175</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
6. Use whole numbers, fractions, and decimals to represent equivalent forms of the same number.	Instructor's Guide: 9, 26, 30, 44, 59, 61, 62, 76, 151
7. Develop and apply number theory concepts in problem solving situations. <ul style="list-style-type: none"> • Primes, factors, multiples • Common multiples, common factors 	Instructor's Guide: 14, 32, 35, 36, 39, 47, 48, 49, 62, 63, 66, 70, 73, 77, 78, 82, 83, 107, 117, 118, 136, 138, 153
8. Compare and order numbers.	Instructor's Guide: 25, 26, 34, 46, 51, 116, 121, 156, 166
<i>B. Numerical Operations</i> 1. Recognize the appropriate use of each arithmetic operation in problem situations.	Instructor's Guide: 20, 37, 92, 93, 125
2. Construct, use, and explain procedures for performing calculations with fractions and decimals with: <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	Instructor's Guide: 10, 29, 40, 46, 54, 60, 65, 69, 102, 103, 109, 116, 121, 125, 129, 131, 134, 136, 160
3. Use an efficient and accurate pencil-and-paper procedure for division of a 3-digit number by a 2-digit number.	Instructor's Guide: n/a
4. Select pencil-and-paper, mental math, or a calculator as the appropriate computational method in a given situation.	Instructor's Guide: 75, 80, 106, 115, 125
5. Find square and cubes of whole numbers.	Instructor's Guide: 1
6. Check the reasonableness of results of computations.	The opportunity to address this objective is available on the following pages: Instructor's Guide: 10, 29, 40, 46, 54, 60, 65, 69, 102, 103, 109, 116, 121, 125, 129, 131, 134, 136, 160
7. Understand and use the various relationships among operations and properties of operations.	Instructor's Guide: 38, 50, 55, 56, 58, 75, 95
8. Understand and apply the standard algebraic order of operations for the four basic operations, including appropriate use of parentheses.	Instructor's Guide: 41, 141, 161, 166, 169

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
<p><i>C. Estimation</i></p> <p>1. Use a variety of strategies for estimating both quantities and the results of computations.</p>	<p>Instructor’s Guide: 55, 45, 65, 71, 96, 130, 135, 145, 158</p>
<p>2. Recognize when an estimate is appropriate, and understand the usefulness of an estimate as distinct from an exact answer.</p>	<p>Instructor’s Guide: 5</p>
<p>3. Determine the reasonableness of an answer by estimating the result of operations.</p>	<p>Instructor’s Guide: 65, 96, 130, 145, 158, 165</p>
<p>4. Determine whether a given estimate is an overestimate or an underestimate.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 65, 96, 130, 145, 158, 165</p>

Standard 4.2
Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
<p><i>A. Geometric Properties</i></p> <p>1. Understand and apply concepts involving lines and angles.</p> <ul style="list-style-type: none"> • Notation for line, ray, angle, line segment • Properties of parallel, perpendicular, and intersecting lines • Sum of the measures of the interior angles of a triangle is 180° 	<p>Instructor’s Guide: 72, 79, 94, 147, 148, 162, 179</p>
<p>2. Identify, describe, compare, and classify polygons and circles.</p> <ul style="list-style-type: none"> • Triangles by angles and sides • Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi • Polygons by number of sides • Equilateral, equiangular, regular • All points equidistant from a given point form a circle 	<p>Instructor’s Guide: 12, 31, 37, 72, 79, 84, 94, 101, 148, 163, 170, 179</p>
<p>5. Identify similar figures.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
4. Understand and apply the concepts of congruence and symmetry (line and rotational).	Instructor's Guide: 72, 79, 94
5. Compare properties of cylinders, prisms, cones, pyramids, and spheres.	Instructor's Guide: 90, 170, 180
6. Identify, describe, and draw the faces or shadow (projections) of three-dimensional geometric objects from different perspectives.	Instructor's Guide: n/a
7. Identify a three-dimensional shape with given projections (top, front and side views).	Instructor's Guide: n/a
8. Identify a three-dimensional shape with a given net (i.e., a flat pattern that folds into a 3-D shape).	Instructor's Guide: 90
<i>B. Transforming Shapes</i>	Instructor's Guide: 52, 53, 58
1. Use a translation, a reflection, or a rotation to map one figure onto another congruent figure.	
2. Recognize, identify, and describe geometric relationships and properties as they exist in nature, art, and other real-world settings.	Instructor's Guide: 17, 101
<i>C. Coordinate Geometry</i>	Instructor's Guide: 114
1. Create geometric shapes with specified properties in the first quadrant on a coordinate grid.	
<i>D. Units of Measurement</i>	Instructor's Guide: 85, 90, 97, 98, 147, 180
1. Select and use appropriate units to measure angles, area, surface area, and volume.	
2. Use a scale to find a distance on a map or a length on a scale drawing.	Instructor's Guide: 180
3. Convert measurement units within a system (e.g., 3 feet = ___ inches).	Instructor's Guide: 11, 24, 31, 86, 124, 136, 174
4. Know approximate equivalents between the standard and metric systems (e.g., one kilometer is approximately 6/10 of a mile)	Instructor's Guide: n/a

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
5. Use measurements and estimates to describe and compare phenomena.	Instructor's Guide: 107, 108
<i>E. Measuring Geometric Objects</i>	Instructor's Guide: 147
1. Use a protractor to measure angles.	
2. Develop and apply strategies and formulas for finding perimeter and area. <ul style="list-style-type: none"> Triangle, square, rectangle, parallelogram, and trapezoid Circumference and area of a circle 	Instructor's Guide: 85, 87, 88, 97, 98, 115, 126, 142, 143, 155, 176
3. Develop and apply strategies and formulas for finding the surface area and volume of rectangular prisms and cylinders.	Instructor's Guide: 90, 180
4. Recognize that shapes with the same perimeter do not necessarily have the same area and vice versa.	Instructor's Guide: 107, 108, 126, 152
6. Develop informal ways of approximating the measures of familiar objects (e.g., use a grid to approximate the area of the bottom of one's foot).	Instructor's Guide: n/a

Standard 4.3
Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
<i>A. Patterns</i>	Instructor's Guide: 7, 8, 12, 13, 14, 17, 18, 22, 23, 27, 28, 32, 33, 52, 53, 63, 68, 72, 73, 74, 77, 78, 82, 83, 88, 92, 93, 97, 98, 102, 103, 108, 123, 136, 138, 143, 148, 149, 153, 158, 171, 712, 173, 177, 178
3. Recognize, describe, extend, and create patterns involving whole numbers and rational numbers. <ul style="list-style-type: none"> Descriptions using tables, verbal rules, simple equations, and graphs Formal iterative formulas (e.g., NEXT = NOW*3) Recursive patterns, including Pascal's Triangle (where each entry is the sum of the entries above it) and the Fibonacci Sequence: 1, 1, 2, 3, 5, 8, ... (where NEXT = NOW + PREVIOUS) 	

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
<p><i>B. Functions and Relationships</i></p> <p>1. Describe the general behavior of functions given by formulas or verbal rules (e.g., graph to determine whether increasing or decreasing, linear or not).</p>	<p>Instructor's Guide: 18, 67</p>
<p><i>C. Modeling</i></p> <p>1. Use patterns, relations, and linear functions to model situations.</p> <ul style="list-style-type: none"> • Using variables to represent unknown quantities • Using concrete materials, tables, graphs, verbal rules, algebraic expressions/equations/inequalities 	<p>Instructor's Guide: 13, 16, 18, 27, 28, 68, 88, 98</p>
<p>2. Draw freehand sketches of graphs that model real phenomena and use such graphs to predict and interpret events.</p> <ul style="list-style-type: none"> • Changes over time • Relations between quantities • Rates of change (e.g., when is plant growing slowly/rapidly, when is temperature dropping most rapidly/slowly) 	<p>Instructor's Guide: n/a</p>
<p><i>D. Procedures</i></p> <p>1. Solve simple linear equations with manipulatives and informally</p> <ul style="list-style-type: none"> • Whole-number coefficients only, answers also whole numbers. • Variables on one or both sides of equation 	<p>Instructor's Guide: 52</p>
<p>2. Understand and apply the properties of operations and numbers.</p> <ul style="list-style-type: none"> • Distributive property • The product of a number and its reciprocal is 1 	<p>Instructor's Guide: 38, 55, 58, 95</p>
<p>3. Evaluate numerical expressions.</p>	<p>Instructor's Guide: 29, 37, 38, 41, 55, 64, 69, 109, 146, 156, 169</p>
<p>4. Extend understanding and use of inequality.</p> <ul style="list-style-type: none"> • Symbols (\geq, \neq, \leq) 	<p>Instructor's Guide: n/a</p>

Standard 4.4
Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
<p><i>A. Data Analysis (or Statistics)</i></p> <p>1. Collect, generate, organize, and display data.</p> <ul style="list-style-type: none"> • Data generated from surveys 	<p>Instructor’s Guide: 122, 123, 132, 133</p>
<p>2. Read, interpret, select, construct, analyze, generate questions about, and draw inferences from displays of data.</p> <ul style="list-style-type: none"> • Bar graph, line graph, circle graph, table, histogram • Range, median, and mean • Calculators and computers used to record and process information 	<p>Instructor’s Guide: 91, 102, 103, 122, 123, 132, 133, 135, 140, 143, 175</p>
<p>3. Respond to questions about data, generate their own questions and hypotheses, and formulate strategies for answering their questions and testing their hypothesis.</p>	<p>Instructor’s Guide: 143</p>
<p><i>B. Probability</i></p> <p>1. Determine probabilities of events.</p> <ul style="list-style-type: none"> • Event, complementary event, probability of an event • Multiplication rule for probabilities • Probability of certain even is 1 and of impossible event is 0 • Probabilities of event and complementary event add up to 1 	<p>Instructor’s Guide: 122, 123, 127, 128, 132, 133</p>
<p>2. Determine probability using intuitive, experimental, and theoretical methods (e.g., using model of picking items of different colors from a bag).</p> <ul style="list-style-type: none"> • Given numbers of various types of items in a bag, what is the probability that an item of one type will be picked • Given data obtained experimentally, what is the likely distribution of items in the bag 	<p>Instructor’s Guide: 122, 123, 127, 128, 132, 133</p>
<p>3. Explore compound events.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
4. Model situations involving probability using simulations (with spinners, dice) and theoretical models.	Instructor's Guide: 122, 123, 127, 128, 132, 133
5. Recognize and understand the connections among the concepts of independent outcomes, picking at random, and fairness.	Instructor's Guide: 122, 123, 127, 128
<p data-bbox="190 472 708 527"><i>C. Discrete Mathematics-Systematic Listing and Counting</i></p> <p data-bbox="190 562 708 653">1. Solve counting problems and justify that all possibilities have been enumerated without duplication.</p> <ul data-bbox="285 657 735 747" style="list-style-type: none"> <li data-bbox="285 657 735 716">• Organized lists, charts, tree diagrams, tables <li data-bbox="285 720 496 747">• Venn diagrams 	Instructor's Guide: 36, 52, 128, 163
<p data-bbox="190 812 735 840">2. Apply the multiplication principle of counting.</p> <ul data-bbox="285 844 784 1119" style="list-style-type: none"> <li data-bbox="285 844 784 903">• Simple situations (e.g., you can make $3 \times 4 = 12$ outfits using 3 shirts and 4 skirts). <li data-bbox="285 907 784 997">• Number of ways a specified number of items can be arranged in order (concept of permutation) <li data-bbox="285 1001 784 1119">• Number of ways of selecting a slate of officers from a class (e.g., if there are 23 students and 3 officers, the number is $23 \times 22 \times 21$) 	Instructor's Guide: n/a
3. List the possible combinations of two elements chosen from a given set (e.g., forming a committee of two from a group of 12 students, finding how many handshakes there will be among ten people if everyone shakes each other person's hand once).	Instructor's Guide: n/a
<p data-bbox="190 1398 735 1453"><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p>	There are no available matches within this section.

Standard 4.5

Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	<p>Instructor’s Guide: 2, 3, 7, 8, 12, 13, 15, 17, 18, 20, 22, 28, 31, 32, 33, 37, 42, 43, 52, 53, 57, 58, 63, 67, 68, 72, 77, 78, 82, 83, 88, 92, 93, 97, 98, 102, 103, 108, 112, 113, 123, 126, 127, 138, 148, 150, 153, 158, 163, 167, 172, 173, 177, 178</p>
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	<p>Instructor’s Guide: 2, 3, 7, 8, 12, 13, 15, 17, 18, 20, 22, 28, 31, 32, 33, 37, 42, 43, 52, 53, 57, 58, 63, 67, 68, 72, 77, 78, 82, 83, 88, 92, 93, 97, 98, 102, 103, 108, 112, 113, 123, 126, 127, 138, 148, 150, 153, 158, 163, 167, 172, 173, 177, 178</p>
<p>4. Pose problems of various types and levels of difficulty.</p>	<p>Instructor’s Guide: 2, 3, 7, 8, 12, 13, 15, 17, 18, 20, 22, 28, 31, 32, 33, 37, 42, 43, 52, 53, 57, 58, 63, 67, 68, 72, 77, 78, 82, 83, 88, 92, 93, 97, 98, 102, 103, 108, 112, 113, 123, 126, 127, 138, 148, 150, 153, 158, 163, 167, 172, 173, 177, 178</p>
<p>5. Monitor their progress and reflect on the process of their problem solving activity.</p>	<p>The opportunity to address this objective is available on the following pages:</p> <p>Instructor’s Guide: 2, 3, 7, 8, 12, 13, 15, 17, 18, 20, 22, 28, 31, 32, 33, 37, 42, 43, 52, 53, 57, 58, 63, 67, 68, 72, 77, 78, 82, 83, 88, 92, 93, 97, 98, 102, 103, 108, 112, 113, 123, 126, 127, 138, 148, 150, 153, 158, 163, 167, 172, 173, 177, 178</p>
<p><i>B. Communication</i></p> <p>1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Analyze and evaluate the mathematical thinking and strategies of others.	Instructor’s Guide: n/a
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<i>C. Connections</i> 1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
4. Apply mathematics in practical situations and in other disciplines.	Instructor’s Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor’s Guide: n/a
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<i>D. Reasoning</i> 1. Recognize that mathematical facts, procedures, and claims must be justified.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Use reasoning to support their mathematical conclusions and problem solutions.	Instructor’s Guide: 2, 3, 7, 8, 12, 13, 15, 17, 18, 20, 22, 28, 31, 32, 33, 37, 42, 43, 52, 53, 57, 58, 63, 67, 68, 72, 77, 78, 82, 83, 88, 92, 93, 97, 98, 102, 103, 108, 112, 113, 123, 126, 127, 138, 148, 150, 153, 158, 163, 167, 172, 173, 177, 178

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 6
3. Select and use various types of reasoning and methods of proof.	Instructor's Guide: 5, 42, 43, 47, 48, 57, 58, 65, 150, 165
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	Instructor's Guide: The opportunity to address this objective is available throughout the text.
5. Make and investigate mathematical conjectures. <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	The opportunity to address this objective is available on the following pages: Instructor's Guide: 2, 3, 7, 8, 12, 13, 15, 17, 18, 20, 22, 28, 31, 32, 33, 37, 42, 43, 52, 53, 57, 58, 63, 67, 68, 72, 77, 78, 82, 83, 88, 92, 93, 97, 98, 102, 103, 108, 112, 113, 123, 126, 127, 138, 148, 150, 153, 158, 163, 167, 172, 173, 177, 178
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Instructor's Guide: n/a
<i>E. Representations</i> 1. Create and use representations to organize, record, and communicate mathematical ideas. <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	Instructor's Guide: 2, 8, 10, 12, 15, 17, 18, 19, 20, 21, 23, 27, 36, 42, 43, 52, 53, 62, 66, 67, 68, 72, 78, 79, 81, 83, 84, 85, 87, 88, 90, 94, 97, 102, 104, 105, 114, 115, 117, 118, 119, 121, 122, 127, 128, 132, 134, 135, 138, 139, 158, 162, 163, 164, 167, 168, 176, 179
2. Select, apply, and translate among mathematical representations to solve problems.	Instructor's Guide: n/a
3. Use representations to model and interpret physical, social, and mathematical phenomena.	Instructor's Guide: n/a
<i>F. Technology</i>	There are no available matches within this section.

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correlated to
New Jersey Mathematics
Academic & Professional Standards
Grade 7

Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
<p><i>A. Number Sense</i></p> <p>1. Extend understanding of the number system by constructing meanings for the following (unless otherwise noted, all indicators for Grade 7 pertain to these sets of numbers as well).</p> <ul style="list-style-type: none"> • Rational numbers • Percents • Whole numbers with exponents 	<p>Instructor's Guide: 1, 14, 31, 32, 39, 48, 51, 60, 127, 136, 175</p>
<p>2. Demonstrate a sense of the relative magnitude of numbers.</p>	<p>Instructor's Guide: n/a</p>
<p>3. Understand and use ratios, proportions, and percents (including percents greater than 100 and less than 1) in a variety of situations.</p>	<p>Instructor's Guide: 10, 44, 77, 78, 82, 92, 93, 99, 100, 104, 106, 110, 120, 129, 131, 135, 151, 157, 158, 162, 170, 177</p>
<p>4. Compare and order numbers of all named typed.</p>	<p>Instructor's Guide: 61, 76, 96, 99, 116, 118, 119, 156, 161</p>
<p>5. Use whole numbers, fractions, decimals, and percents to represent equivalent forms of the same number.</p>	<p>Instructor's Guide: 26, 27, 54, 59, 61, 76</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
6. Understand that all fractions can be represented as repeating or terminating decimals.	Instructor's Guide: 27, 28, 59
7. Explore settings that give rise to negative numbers. <ul style="list-style-type: none"> • Temperatures below 0 degrees, debts • Extensions of the number line 	Instructor's Guide: n/a
<i>B. Numerical Operations</i> 1. Use and explain procedures for performing calculations with integers and all number types named above with: <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	Instructor's Guide: 16, 20, 25, 31, 34, 35, 40, 44, 46, 51, 55, 65, 67, 72, 80, 81, 95, 96, 100, 105, 109, 110, 111, 112, 113, 116, 118, 121, 129, 131, 139, 150, 151, 159, 160, 161, 177
2. Use exponentiation to find whole number powers of numbers.	Instructor's Guide: 1, 32, 33, 48, 48
3. Understand and apply the standard algebraic order of operations, including appropriate use of parentheses.	Instructor's Guide: 69, 124, 141, 161
<i>C. Estimation</i> 1. Use equivalent representations of numbers such as fractions, decimals, and percents to facilitate estimation.	Instructor's Guide: 35, 95, 97, 98, 111, 135, 160

Standard 4.2 Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
<p><i>A. Geometric Properties</i></p> <p>1. Understand apply properties of polygons.</p> <ul style="list-style-type: none"> • Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi • Regular polygons 	<p>Instructor's Guide: 7, 8, 17, 21, 89, 94, 101, 117, 118, 152, 153, 157, 158, 169, 179</p>
<p>2. Understand and apply the concept of similarity.</p> <ul style="list-style-type: none"> • Using proportions to find missing measures • Scale drawings • Models of 3D objects 	<p>Instructor's Guide: 77, 78, 170</p>
<p>3. Use logic and reasoning to make and support conjectures about geometric objects.</p>	<p>Instructor's Guide: 7, 8, 15, 37, 132</p>
<p><i>B. Transforming Shapes</i></p> <p>1. Understand and apply transformations.</p> <ul style="list-style-type: none"> • Finding the image, given the pre-image, and vice-versa • Sequence of transformations needed to map one figure onto another • Reflections, rotations, and translations result in images congruent to the pre-image • Dilations (stretching/shrinking) result in images similar to the pre-image 	<p>Instructor's Guide: 7, 15, 21, 42, 43, 164, 179</p>
<p><i>C. Coordinate Geometry</i></p> <p>1. Use coordinates in four quadrants to represent geometric concepts.</p>	<p>Instructor's Guide: 114</p>
<p>2. Use a coordinate grid to model and quantify transformations (e.g., translate right 4 units).</p>	<p>Instructor's Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
<p><i>D. Units of Measurement</i></p> <p>1. Solve problems requiring calculations that involve different units of measurement within a measurement system (e.g., 4'3" plus 7'10" equals 12'1").</p>	<p>Instructor's Guide: 11, 86, 135, 162, 163</p>
<p>2. Select and use appropriate units and tools to measure quantities to the degree of precision needed in a particular problem-solving situation.</p>	<p>Instructor's Guide: 19</p>
<p>3. Recognize that all measurements of continuous quantities are approximations.</p>	<p>Instructor's Guide: n/a</p>
<p><i>E. Measuring Geometric Objects</i></p> <p>1. Develop and apply strategies for finding perimeter and area.</p> <ul style="list-style-type: none"> • Geometric figures made by combining triangles, rectangles and circles or parts of circles • Estimation of area using grids of various sizes 	<p>Instructor's Guide: 12, 50, 74, 87, 92, 93, 126, 171</p>
<p>2. Recognize that the volume of a pyramid or cone is one-third of the volume of the prism or cylinder with the same base and height (e.g., use rice to compare volumes of figures with the same base and height).</p>	<p>Instructor's Guide: n/a</p>

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
<p><i>A. Patterns</i></p> <p>2. Recognize, describe, extend, and create patterns involving whole numbers, rational numbers, and integers.</p> <ul style="list-style-type: none"> • Descriptions using tables, verbal and symbolic rules, graphs, simple equations or expressions • Finite and infinite sequences • Generate sequences by using calculators to repeatedly apply a formula 	<p>Instructor's Guide: 12, 27, 28, 32, 33, 48, 52, 53, 57, 63, 73, 74, 78, 88, 108, 128, 133, 163, 166, 167, 168, 173, 177, 178</p>
<p><i>B. Functions and Relationships</i></p> <p>3. Graph functions, and understand and describe their general behavior.</p> <p style="padding-left: 20px;">a. Equations involving two variables</p>	<p>Instructor's Guide: 29, 67, 72, 83, 88</p>
<p><i>C. Modeling</i></p> <p>1. Analyze functional relationships to explain how a change in one quantity can result in a change in another, using pictures, graphs, charts, and equations.</p>	<p>Instructor's Guide: 5, 10, 13, 16, 18, 29, 38, 53, 63, 67, 72, 110, 128, 133, 148, 155, 158, 163, 168, 172, 173</p>
<p>2. Use patterns, relations, symbolic algebra, and linear functions to model situations.</p> <ul style="list-style-type: none"> • Using manipulatives, tables, graphs, verbal rules, algebraic expressions/equations/inequalities • Growth situations, such as population growth and compound interest, using recursive (e.g., NOW-NEXT) formulas 	<p>Instructor's Guide: 5, 10, 13, 16, 18, 29, 38, 53, 63, 67, 72, 110, 128, 133, 148, 155, 158, 163, 168, 172, 173</p>
<p><i>D. Procedures</i></p> <p>1. Use graphing techniques on a number line.</p> <ul style="list-style-type: none"> • Absolute value • Arithmetic operations represented by vectors (arrows) (e.g., “-3+6” is “left 3, right 6”) 	<p>Instructor's Guide: 31</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
2. Solve simple linear equations informally and graphically. <ul style="list-style-type: none"> • Multi-step, integer coefficients only (although answers may not be integers) • Use paper-and-pencil, calculators, graphing calculators, spreadsheets, and other technology 	Instructor’s Guide: 16, 29, 56, 60, 63, 83, 88, 144
3. Create, evaluate, and simplify algebraic expressions involving variables. <ul style="list-style-type: none"> • Order of operations, including appropriate use of parentheses • Substitution of a number for a variable 	Instructor’s Guide: 41, 64, 81, 141, 146, 155
4. Understand and apply the properties of operations, numbers, equations, and inequalities. <ul style="list-style-type: none"> • Additive inverse • Multiplicative inverse 	Instructor’s Guide: 16, 71, 149

Standard 4.4
Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
<i>A. Data Analysis (or Statistics)</i> 1. Select and use appropriate representations for sets of data, and measures of central tendency (mean, median, and mode). <ul style="list-style-type: none"> • Type of display most appropriate for given data • Box-and whisker plot, upper quartile, lower quartile • Scatter plot • Calculators and computer used to record and process information 	Instructor’s Guide: 2, 22, 75, 82, 83, 88, 90, 91, 102, 103, 107, 108, 122, 124, 135, 137, 165
2. Make inferences and formulate and evaluate arguments based on displays and analysis of data.	Instructor’s Guide: 75, 82, 88, 140, 165
<i>B. Probability</i> 1. Interpret probabilities as ratios, percents, and decimals.	Instructor’s Guide: 22, 125, 137, 142, 143

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
2. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models. <ul style="list-style-type: none"> • Frequency, relative frequency 	Instructor’s Guide: 22, 23, 123
3. Estimate probabilities and make predictions based on experimental and theoretical probabilities.	Instructor’s Guide: 3, 23, 92, 93, 123, 125, 137, 138, 142, 143
4. Play and analyze probability-based games, and discuss the concepts of fairness and expected value.	Instructor’s Guide: 2, 3, 22, 23, 138
<i>C. Discrete Mathematics-Systematic Listing and Counting</i> 1. Apply the multiplication principle of counting <ul style="list-style-type: none"> • Permutations: ordered situations with replacement (e.g., number of possible license plates) vs. ordered situations without replacement (e.g., number of possible slates of 3 class officers from a 23 student class) 	Instructor’s Guide: 85
2. Explore counting problems involving Venn diagrams with 3 attributes (e.g., there are 15, 20, and 25 students respectively in the chess club, the debating team, and the engineering society; how many different students belong to the three clubs if there are 6 students in chess and debating, 7 students in chess and engineering, 8 students in debating and engineering, and 2 students in all three?).	The opportunity to address this objective is available on the following page: Instructor’s Guide: 30
3. Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.	Instructor’s Guide: 85, 125
<i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i>	There are no available matches within this section.

Standard 4.5

Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	<p>Instructor’s Guide: 5, 7, 8, 12, 13, 18, 20, 22, 28, 32, 33, 38, 42, 43, 48, 50, 52, 53, 57, 58, 62, 63, 65, 70, 73, 83, 85, 88, 92, 93, 97, 98, 108, 110, 113, 115, 117, 118, 120, 127, 128, 133, 143, 145, 147, 148, 157, 158, 163, 167, 168, 170, 173, 177, 178</p>
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	<p>Instructor’s Guide: 5, 7, 8, 12, 13, 18, 20, 22, 28, 32, 33, 38, 42, 43, 48, 50, 52, 53, 57, 58, 62, 63, 65, 70, 73, 83, 85, 88, 92, 93, 97, 98, 108, 110, 113, 115, 117, 118, 120, 127, 128, 133, 143, 145, 147, 148, 157, 158, 163, 167, 168, 170, 173, 177, 178</p>
<p>4. Pose problems of various types and levels of difficulty.</p>	<p>Instructor’s Guide: 5, 7, 8, 12, 13, 18, 20, 22, 28, 32, 33, 38, 42, 43, 48, 50, 52, 53, 57, 58, 62, 63, 65, 70, 73, 83, 85, 88, 92, 93, 97, 98, 108, 110, 113, 115, 117, 118, 120, 127, 128, 133, 143, 145, 147, 148, 157, 158, 163, 167, 168, 170, 173, 177, 178</p>
<p>5. Monitor their progress and reflect on the process of their problem solving activity.</p>	<p>The opportunity to address this objective is available on the following pages: Instructor’s Guide: 5, 7, 8, 12, 13, 18, 20, 22, 28, 32, 33, 38, 42, 43, 48, 50, 52, 53, 57, 58, 62, 63, 65, 70, 73, 83, 85, 88, 92, 93, 97, 98, 108, 110, 113, 115, 117, 118, 120, 127, 128, 133, 143, 145, 147, 148, 157, 158, 163, 167, 168, 170, 173, 177, 178</p>
<p><i>B. Communication</i></p> <p>1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Analyze and evaluate the mathematical thinking and strategies of others.	Instructor’s Guide: n/a
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<i>C. Connections</i> 1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
4. Apply mathematics in practical situations and in other disciplines.	Instructor’s Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor’s Guide: n/a
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<i>D. Reasoning</i> 1. Recognize that mathematical facts, procedures, and claims must be justified.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Use reasoning to support their mathematical conclusions and problem solutions.	Instructor’s Guide: 5, 7, 8, 12, 13, 18, 20, 22, 28, 32, 33, 38, 42, 43, 48, 50, 52, 53, 57, 58, 62, 63, 65, 70, 73, 83, 85, 88, 92, 93, 97, 98, 108, 110, 113, 115, 117, 118, 120, 127, 128, 133, 143, 145, 147, 148, 157, 158, 163, 167, 168, 170, 173, 177, 178

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 7
3. Select and use various types of reasoning and methods of proof.	Instructor’s Guide: 15, 35, 62, 65, 95
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
5. Make and investigate mathematical conjectures. <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	The opportunity to address this objective is available on the following pages: Instructor’s Guide: 5, 7, 8, 12, 13, 18, 20, 22, 28, 32, 33, 38, 42, 43, 48, 50, 52, 53, 57, 58, 62, 63, 65, 70, 73, 83, 85, 88, 92, 93, 97, 98, 108, 110, 113, 115, 117, 118, 120, 127, 128, 133, 143, 145, 147, 148, 157, 158, 163, 167, 168, 170, 173, 177, 178
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Instructor’s Guide: n/a
<i>E. Representations</i> 1. Create and use representations to organize, record, and communicate mathematical ideas. <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	Instructor’s Guide: 4, 7, 10, 12, 14, 15, 17, 18, 19, 20, 21, 24, 30, 31, 34, 37, 42, 45, 50, 53, 67, 72, 74, 77, 79, 82, 83, 84, 85, 87, 88, 89, 92, 94, 100, 101, 102, 112, 114, 115, 116, 117, 118, 125, 127, 132, 133, 134, 138, 145, 147, 153, 154, 163, 164, 165, 167, 1369, 170, 174, 176, 179, 180
2. Select, apply, and translate among mathematical representations to solve problems.	Instructor’s Guide: n/a
3. Use representations to model and interpret physical, social, and mathematical phenomena.	Instructor’s Guide: n/a
<i>F. Technology</i>	There are no available matches within this section.

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correlated to
New Jersey Mathematics
Academic & Professional Standards
Grade 8

Standard 4.1
Number and Numerical Operations

All students will develop number sense and will perform standard numerical operations and estimations on all types of numbers in a variety of ways.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p><i>A. Number Sense</i></p> <p>1. Extend understanding of the number system by constructing meanings for the following (unless otherwise noted, all indicators for Grade 8 pertain to these sets of numbers as well):</p> <ul style="list-style-type: none"> • Rational numbers • Percents • Exponents • Roots • Absolute values • Numbers represented in scientific notation 	<p>Instructor's Guide: 1, 13, 14, 34, 37, 38, 50, 65, 66, 92, 93, 136, 152</p>
<p>2. Demonstrate a sense of the relative magnitude of numbers.</p>	<p>Instructor's Guide: n/a</p>
<p>3. Understand and use ratios, proportions, and percents (including percents greater than 100 and less than 1) in a variety of situations.</p>	<p>Instructor's Guide: 3, 10, 44, 99, 104, 106, 110, 119, 135, 147, 151, 156</p>
<p>4. Compare and order numbers of all named typed.</p>	<p>Instructor's Guide: 9, 26, 99</p>
<p>5. Use whole numbers, fractions, decimals, and percents to represent equivalent forms of the same number.</p>	<p>Instructor's Guide: 26, 54, 59, 61, 96</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
6. Recognize that repeating decimals correspond to fractions and determine their fractional equivalents. <ul style="list-style-type: none"> • $5/7=0.714285714285\dots=0.714285$ 	Instructor’s Guide: n/a
7. Construct meanings for common irrational numbers, such as π (pi) and the square root of 2.	Instructor’s Guide: n/a
<i>B. Numerical Operations</i> 1. Use and explain procedures for performing calculations involving addition, subtraction, multiplication, division, and exponentiation with integers and all number types named above with: <ul style="list-style-type: none"> • Pencil-and-paper • Mental math • Calculator 	Instructor’s Guide: 1, 6, 31, 34, 37, 40, 45, 46, 51, 65, 81, 95, 96, 99, 106, 109, 111, 115, 116, 117, 118, 121, 124, 129, 139, 140, 156, 159, 160, 161
2. Use exponentiation to find whole number powers of numbers.	Instructor’s Guide: 1
3. Find square and cube roots of numbers and understand the inverse nature of powers and roots.	Instructor’s Guide: 1, 13, 14, 49, 118, 136
4. Solve problems involving proportions and percents.	Instructor’s Guide: 104, 106, 110, 119, 151, 156
5. Understand and apply the standard algebraic order of operations, including appropriate use of parentheses.	Instructor’s Guide: 41, 69, 95, 115, 124, 141, 161
<i>C. Estimation</i> 1. Estimate square roots and cube roots of numbers.	Instructor’s Guide: n/a
2. Use equivalent representations of numbers such as fractions, decimals, and percents to facilitate estimation.	Instructor’s Guide: 100, 135, 159, 160
3. Recognize the limitations of estimation and assess the amount of error resulting from estimation.	Instructor’s Guide: n/a

Standard 4.2

Geometry and Measurement

All students will develop spatial sense and the ability to use geometric properties, relationships, and measurement to model, describe and analyze phenomena.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p><i>A. Geometric Properties</i></p> <p>1. Understand apply concepts involving lines, angles, and planes.</p> <ul style="list-style-type: none"> • Complementary and supplementary angles • Vertical angles • Bisectors and perpendicular bisectors • Parallel, perpendicular, and intersecting planes • Intersection of plane with cube, cylinder, cone, and sphere 	<p>Instructor's Guide: 33, 82, 91, 101, 105, 107, 148, 172, 173</p>
<p>2. Understand and apply the Pythagorean theorem.</p>	<p>Instructor's Guide: 27, 50, 112, 113, 152</p>
<p>3. Understand and apply properties of polygons.</p> <ul style="list-style-type: none"> • Quadrilaterals, including squares, rectangles, parallelograms, trapezoids, rhombi • Regular polygons • Sum of measures of interior angles of a polygon • Which polygons can be used alone to generate a tessellation and why 	<p>Instructor's Guide: 32, 33, 101, 107, 108, 134, 147, 148, 167, 168</p>
<p>4. Understand and apply the concept of similarity</p> <ul style="list-style-type: none"> • Using proportions to find missing measures • Scale drawings • Models of 3D objects 	<p>Instructor's Guide: 10, 15, 17, 47, 48, 157, 158, 170, 171, 176</p>
<p>5. Use logic and reasoning to make and support conjectures about geometric objects.</p>	<p>Instructor's Guide: 82, 83, 87</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p><i>B. Transforming Shapes</i></p> <p>1. Understand and apply transformations.</p> <ul style="list-style-type: none"> • Finding the image, given the pre-image, and vice-versa • Sequence of transformations needed to map one figure onto another • Reflections, rotations, and translations result in images congruent to the pre-image • Dilations (stretching/shrinking) result in images similar to the pre-image 	<p>Instructor’s Guide: 15, 22, 23, 82, 83, 87, 88, 137, 138, 179</p>
<p>2. Use iterative procedure to generate geometric patterns.</p> <ul style="list-style-type: none"> • Fractals (e.g., the Koch Snowflake) • Self-similarity • Construction of initial stages • Patterns in successive stages (e.g., number of triangles in each stage of Sierpinski’s Triangle) 	<p>Instructor’s Guide: 107, 108, 167, 168</p>
<p><i>C. Coordinate Geometry</i></p> <p>1. Use coordinates in four quadrants to represent geometric concepts.</p>	<p>Instructor’s Guide: 137, 138</p>
<p>2. Use a coordinate grid to model and quantify transformations (e.g., translate right 4 units).</p>	<p>Instructor’s Guide: 22, 23, 87, 137, 138</p>
<p><i>D. Units of Measurement</i></p> <p>1. Solve problems requiring calculations that involve different units of measurement within a measurement system (e.g., 4’3” plus 7’10” equals 12’1”).</p>	<p>Instructor’s Guide: 11, 55, 157, 158, 159, 165</p>
<p>2. Use approximate equivalents between standard and metric systems to estimate measurements (e.g., 5 kilometers is about 3 miles).</p>	<p>Instructor’s Guide: n/a</p>
<p>3. Recognize that the degree of precision needed in calculations depends on how the results will be used and the instruments used to generate the measurements.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
4. Select and use appropriate units and tools to measure quantities to the degree of precision needed in a particular problem-solving situation.	Instructor's Guide: 17
5. Recognize that all measurements of continuous quantities are approximations.	Instructor's Guide: n/a
6. Solve problems that involve compound measurements units, such as speed (miles per hour), air pressure (pounds per square inch), and population density (persons per square mile).	Instructor's Guide: 159
<p data-bbox="190 625 542 655"><i>E. Measuring Geometric Objects</i></p> <p data-bbox="190 684 781 743">1. Develop and apply strategies for finding perimeter and area.</p> <ul data-bbox="285 747 786 961" style="list-style-type: none"> <li data-bbox="285 747 786 835">• Geometric figures made by combining triangles, rectangles and circles or parts of circles <li data-bbox="285 840 786 898">• Estimation of area using grids of various sizes <li data-bbox="285 903 786 961">• Impact of a dilation on the perimeter and area of a 2-dimensional figure 	Instructor's Guide: 2, 14, 47, 48, 52, 53, 74, 76, 112, 113, 126, 155, 171, 180
2. Recognize that the volume of a pyramid or cone is one-third of the volume of the prism or cylinder with the same base and height (e.g., use rice to compare volumes of figures with the same base and height).	Instructor's Guide: n/a
<p data-bbox="190 1241 737 1329">3. Develop and apply strategies and formulas for finding the surface area and volume of a three-dimensional figure.</p> <ul data-bbox="285 1333 769 1518" style="list-style-type: none"> <li data-bbox="285 1333 769 1365">• Volume-prism, cone, pyramid <li data-bbox="285 1369 769 1457">• Surface area-prism (triangular or rectangular base), pyramid (triangular or rectangular base) <li data-bbox="285 1461 769 1518">• Impact of a dilation on the surface area and volume of a 3 dimensional figure 	Instructor's Guide: 19, 24, 92, 130, 145, 176
4. Use formulas to find the volume and surface area of a sphere.	Instructor's Guide: n/a

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions, and algebraic concepts and processes.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p><i>A. Patterns</i></p> <p>1. Recognize, describe, extend, and create patterns involving whole numbers, rational numbers, and integers.</p> <ul style="list-style-type: none"> • Descriptions using tables, verbal and symbolic rules, graphs, simple equations or expressions • Finite and infinite sequences • Arithmetic sequences (i.e., sequences generated by repeated addition of a fixed number, positive or negative) • Geometric sequences (i.e., sequences generated by repeated multiplication by a fixed positive ratio, greater than 1 or less than 1) • Generating sequences by using calculators to repeatedly apply a formula 	<p>Instructor's Guide: 7, 8, 13, 18, 42, 43, 67, 68, 72, 73, 74, 77, 78, 88, 153, 167</p>
<p><i>B. Functions and Relationships</i></p> <p>1. Graph functions, and understand and describe their general behavior.</p> <ul style="list-style-type: none"> b. Equations involving two variables c. Rates of change (informal notion of slope) 	<p>Instructor's Guide: 17, 18, 22, 23, 29, 37, 38, 97, 98, 164</p>
<p>2. Recognize and describe the difference between linear and exponential growth, using tables, graphs, and equations.</p>	<p>Instructor's Guide: n/a</p>
<p><i>C. Modeling</i></p> <p>1. Analyze functional relationships to explain how a change in one quantity can result in a change in another, using pictures, graphs, charts, and equations.</p>	<p>Instructor's Guide: 5, 77, 78, 97, 105, 131, 146, 150, 153</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p>2. Use patterns, relations, symbolic algebra, and linear functions to model situations.</p> <ul style="list-style-type: none"> • Using concrete materials (manipulatives), tables, graphs, verbal rules, algebraic expressions/equations/inequalities • Growth situations, such as population growth and compound interest, using recursive (e.g., NOW-NEXT) formulas 	<p>Instructor’s Guide: 5, 77, 78, 97, 105, 131, 146, 150, 153</p>
<p><i>D. Procedures</i></p> <p>1. Use graphing techniques on a number line.</p> <ul style="list-style-type: none"> • Absolute value • Arithmetic operations represented by vectors (arrows) (e.g., “-3+6” is “left 3, right 6”) 	<p>Instructor’s Guide: 30, 65</p>
<p>2. Solve simple linear equations informally, graphically, and using formal algebraic methods.</p> <ul style="list-style-type: none"> • Multi-step, integer coefficients only (although answers may not be integers) • Use paper-and-pencil, calculators, graphing calculators, spreadsheets, and other technology 	<p>Instructor’s Guide: 16, 18, 29, 56, 144, 164</p>
<p>3. Solve simple linear inequalities.</p>	<p>Instructor’s Guide: 86, 120, 154</p>
<p>4. Create, evaluate, and simplify algebraic expressions involving variables.</p> <ul style="list-style-type: none"> • Order of operations, including appropriate use of parentheses • Distributive property • Substitution of a number for a variable • Translation of a verbal phrase or sentence into an algebraic expression, equation, or inequality, and vice versa 	<p>Instructor’s Guide: 41, 43, 64, 121, 146</p>
<p>5. Understand and apply the properties of operations, numbers, equations, and inequalities.</p> <ul style="list-style-type: none"> • Additive inverse • Multiplicative inverse • Addition and multiplication properties of equality • Addition and multiplication properties of inequalities 	<p>Instructor’s Guide: 25, 71, 149</p>

Standard 4.4
Data Analysis, Probability, and Discrete Mathematics

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p><i>A. Data Analysis (or Statistics)</i></p> <p>1. Select and use appropriate representations for sets of data, and measures of central tendency (mean, median, and mode).</p> <ul style="list-style-type: none"> • Type of display most appropriate for given data • Box-and whisker plot, upper quartile, lower quartile • Scatter plot • Calculators and computer used to record and process information • Finding the median and mean (weighted average) using frequency data • Effect of additional data on measures of central tendency 	<p>Instructor’s Guide: 39, 70, 75, 110, 172, 173</p>
<p>2. Make inferences and formulate and evaluate arguments based on displays and analysis of data.</p>	<p>Instructor’s Guide: 75, 80, 127, 135</p>
<p>3. Estimate lines of best fit and use them to interpolate within the range of the data.</p>	<p>Instructor’s Guide: n/a</p>
<p>4. Use surveys and sampling techniques to generate data and draw conclusions about large groups.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>B. Probability</i></p> <p>1. Interpret probabilities as ratios, percents, and decimals.</p>	<p>Instructor’s Guide: 125, 142, 143</p>
<p>2. Determine probabilities of compound events.</p>	<p>Instructor’s Guide: 128, 142, 143</p>
<p>3. Explore the probabilities of conditional events (e.g., if there are seven marbles in a bag, three red and four green, what is the probability that two marbles picked from the bag, without replacement, are both red).</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p>4. Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models.</p> <ul style="list-style-type: none"> • Frequency, relative frequency 	<p>Instructor’s Guide: 128</p>
<p>3. Estimate probabilities and make predictions based on experimental and theoretical probabilities.</p>	<p>Instructor’s Guide: 142, 143</p>
<p>4. Play and analyze probability-based games, and discuss the concepts of fairness and expected value.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>C. Discrete Mathematics-Systematic Listing and Counting</i></p> <p>1. Apply the multiplication principle of counting</p> <ul style="list-style-type: none"> • Permutations: ordered situations with replacement (e.g., number of possible license plates) vs. ordered situations without replacement (e.g., number of possible slates of 3 class officers from a 23 student class) • Factorial notation • Concept of combinations (e.g., number of possible delegations of 3 out of 23 students) 	<p>Instructor’s Guide: 27, 28, 125, 175</p>
<p>2. Explore counting problems involving Venn diagrams with 3 attributes (e.g., there are 15, 20, and 25 students respectively in the chess club, the debating team, and the engineering society; how many different students belong to the three clubs if there are 6 students in chess and debating, 7 students in chess and engineering, 8 students in debating and engineering, and 2 students in all three?).</p>	<p>The opportunity to address this objective is available on the following page: Instructor’s Guide: 60</p>
<p>3. Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.</p>	<p>Instructor’s Guide: 27, 28, 125, 175</p>
<p><i>D. Discrete Mathematics-Vertex-Edge Graphs and Algorithms</i></p>	<p>There are no available matches within this section.</p>

Standard 4.5

Mathematical Processes

All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
<p><i>A. Problem Solving</i></p> <p>1. Learn mathematics through problem solving, inquiry, and discovery.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Solve problems that arise in mathematics and in other contexts (cf. workplace readiness standard 8.3)</p> <ul style="list-style-type: none"> • Open-ended problems • Non-routine problems • Problems with multiple solutions • Problems that can be solved in several ways 	<p>Instructor’s Guide: 7, 8, 13, 23, 28, 32, 33, 42, 43, 48, 50, 57, 58, 62, 63, 67, 68, 72, 73, 77, 78, 92, 93, 102, 103, 112, 113, 122, 123, 128, 132, 138, 143, 145, 148, 152, 153, 155, 157, 158, 162, 163, 170, 173</p>
<p>3. Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.</p>	<p>Instructor’s Guide: 7, 8, 13, 23, 28, 32, 33, 42, 43, 48, 50, 57, 58, 62, 63, 67, 68, 72, 73, 77, 78, 92, 93, 102, 103, 112, 113, 122, 123, 128, 132, 138, 143, 145, 148, 152, 153, 155, 157, 158, 162, 163, 170, 173</p>
<p>4. Pose problems of various types and levels of difficulty.</p>	<p>Instructor’s Guide: 7, 8, 13, 23, 28, 32, 33, 42, 43, 48, 50, 57, 58, 62, 63, 67, 68, 72, 73, 77, 78, 92, 93, 102, 103, 112, 113, 122, 123, 128, 132, 138, 143, 145, 148, 152, 153, 155, 157, 158, 162, 163, 170, 173</p>
<p>5. Monitor their progress and reflect on the process of their problem solving activity.</p>	<p>Instructor’s Guide: n/a</p>
<p><i>B. Communication</i></p> <p>1. Use communication to organize and clarify their mathematical thinking.</p> <ul style="list-style-type: none"> • Reading and writing • Discussion, listening, and questioning 	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others, both orally and in writing.</p>	<p>Instructor’s Guide: The opportunity to address this objective is available throughout the text.</p>
<p>3. Analyze and evaluate the mathematical thinking and strategies of others.</p>	<p>Instructor’s Guide: n/a</p>

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
4. Use the language of mathematics to express mathematical ideas precisely.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<p><i>C. Connections</i></p> <p>1. Recognize recurring themes across mathematical domains (e.g., patterns in number, algebra, and geometry).</p>	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Use connections among mathematical ideas to explain concepts (e.g., two linear equations have a unique solution because the lines they represent intersect at a single point).	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
3. Recognize that mathematics is used in a variety of contexts outside of mathematics.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
4. Apply mathematics in practical situations and in other disciplines.	Instructor’s Guide: n/a
5. Trace the development of mathematical concepts over time and across cultures (cf. world languages and social studies standards).	Instructor’s Guide: n/a
6. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
<p><i>D. Reasoning</i></p> <p>1. Recognize that mathematical facts, procedures, and claims must be justified.</p>	Instructor’s Guide: The opportunity to address this objective is available throughout the text.
2. Use reasoning to support their mathematical conclusions and problem solutions.	Instructor’s Guide: 7, 8, 13, 23, 28, 32, 33, 42, 43, 48, 50, 57, 58, 62, 63, 67, 68, 72, 73, 77, 78, 92, 93, 102, 103, 112, 113, 122, 123, 128, 132, 138, 143, 145, 148, 152, 153, 155, 157, 158, 162, 163, 170, 173
3. Select and use various types of reasoning and methods of proof.	Instructor’s Guide: 12, 15, 72, 73, 77, 122, 123, 128, 132
4. Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.	Instructor’s Guide: The opportunity to address this objective is available throughout the text.

Strands and Cumulative Progress Indicators	Afterschool Achievers: Math Club Grade 8
5. Make and investigate mathematical conjectures. <ul style="list-style-type: none"> • Counterexamples as a means of disproving conjectures • Verifying conjectures using informal reasoning or proofs 	The opportunity to address this objective is available on the following pages: Instructor's Guide: 7, 8, 13, 23, 28, 32, 33, 42, 43, 48, 50, 57, 58, 62, 63, 67, 68, 72, 73, 77, 78, 92, 93, 102, 103, 112, 113, 122, 123, 128, 132, 138, 143, 145, 148, 152, 153, 155, 157, 158, 162, 163, 170, 173
6. Evaluate examples of mathematical reasoning and determine whether they are valid.	Instructor's Guide: n/a
<i>E. Representations</i> 1. Create and use representations to organize, record, and communicate mathematical ideas. <ul style="list-style-type: none"> • Concrete representations (e.g., base-ten blocks or algebra tiles) • Pictorial representations (e.g., diagrams, charts, or tables) • Symbolic representations (e.g., a formula) • Graphical representations (e.g., a line graph) 	Instructor's Guide: 12, 14, 15, 17, 19, 21, 22, 23, 26, 30, 32, 34, 37, 42, 50, 52, 53, 54, 57, 58, 65, 67, 68, 72, 73, 74, 75, 77, 79, 82, 83, 84, 86, 87, 88, 89, 91, 92, 94, 96, 97, 98, 101, 107, 112, 113, 114, 122, 123, 125, 127, 132, 134, 135, 137, 138, 146, 147, 148, 152, 154, 157, 162, 163, 164, 167, 168, 169, 170, 172, 173, 174, 175, 176, 179, 180
2. Select, apply, and translate among mathematical representations to solve problems.	Instructor's Guide: n/a
3. Use representations to model and interpret physical, social, and mathematical phenomena.	Instructor's Guide: n/a
<i>F. Technology</i>	There are no available matches within this section.