

Mathematics – PLANNED COURSE OUTLINE
 Avon Grove School District
 Kindergarten

State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.1. Numbers, Number Systems and Number Relationships			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • New understandings evolve from the connection between prior knowledge and new concepts. • Numbers are part of our daily lives. • Numbers can be represented in different ways. • Numbers are related to each other operationally. • Patterns exist in many forms. • Place value of digits helps us count, order and group numbers. 		Essential Questions: <ol style="list-style-type: none"> 1. How do we use prior knowledge and new concepts to form new understandings? 2. How are numbers important in our daily lives? 3. How can numbers be represented? 4. How can parts of a whole and parts of a group be represented? 5. How do fact families help us understand basic operation problems? 6. How do patterns help us solve problems? 7. How are numbers compared and sequenced? 8. How is money counted? 9. How does the place value of digits help us in counting, ordering and grouping numbers? 	
A. Count using whole numbers (to 10,000) and by 2's, 3's, 5's, 10's, 25's and 100's. <u>PA Benchmark- Kindergarten</u> 2.1A Count using whole numbers (to 100) by ones and tens (rote counting).		Investigations: <ul style="list-style-type: none"> • Mathematical Thinking 	Formative: Routines Observations
B. Use whole numbers and fractions to represent quantities. <u>PA Benchmark- Kindergarten</u> 2.1B Use concrete objects to represent quantities up to and including 20. 2.1D Use concrete objects to separate a set into two equal parts using the terms half and whole.	Write the fraction that corresponds to a drawing or part of a set (numerators 1-9, denominators 2-10. No equivalent or improper fractions or mixed numbers). M3.A.1.2.1	Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Supplemental Fraction Unit • Manipulatives 	Formative: Routines Observations Summative: Fraction Assessment

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Standard: 2.1. Numbers, Number Systems and Number Relationships			
<p>C. Represent equivalent forms of the same number through the use of concrete objects, drawings, word names and symbols.</p> <p><u>PA Benchmark- Kindergarten</u> 2.1C Represent equivalent forms of the same number through the use of concrete objects and drawings up to and including 20.</p>	<p>Match the word name with the appropriate whole number (up through 9,999). M3.A.1.1.1</p> <p>Match a symbolic representation of numbers to appropriate whole numbers (e.g. base ten blocks, 7 hundreds, 4 tens, 8 ones, etc.). M3.A.1.1.5</p>	<p>Investigations:</p> <ul style="list-style-type: none"> Mathematical Thinking 	<p>Formative:</p> <p>Routines Observations</p>
<p>D. Use drawings, diagrams or models to show the concept of fraction as part of a whole.</p> <p><u>PA Benchmark- Kindergarten</u> 2.1D Use concrete objects to separate a set into two equal parts using the terms half and whole.</p>	<p>Create a drawing or set that represents a given fraction (numerator 1-9, denominator 2-10. No equivalent or improper fractions or mixed numbers). M3.A.1.2.2</p>	<p>Investigations:</p> <ul style="list-style-type: none"> Supplemental Fraction Unit Manipulatives 	<p>Formative:</p> <p>Routines Observations</p> <p>Summative:</p> <p>Fraction Assessment</p>
<p>E. Count, compare and make change using a collection of coins and one-dollar bills.</p> <p><u>PA Benchmark- Kindergarten</u> 2.1J Identify pennies, nickels, dimes and quarters by name and value.</p> <p>2.1K Count pennies and dimes.</p>	<p>Count a collection of bills and coins less than \$5.00 (penny, nickel, dime, quarter, dollar). Money may be represented as 15 cents, 15c or \$0.15. M3.A.1.3.1</p> <p>Compare total values of combinations of coins less than \$5.00 (penny, nickel, dime, quarter, dollar). M3.A.1.3.2</p> <p>Make change for an amount up to \$5.00 with no more than \$2.00 change given (penny, nickel, dime, quarter, dollar). M3.A.1.3.3</p>	<p>Investigations:</p> <ul style="list-style-type: none"> Supplemental Money Unit Counting 10's Manipulatives 	<p>Formative:</p> <p>Routines Observations</p> <p>Summative:</p> <p>Money Assessment</p>

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Standard: 2.1. Numbers, Number Systems and Number Relationships			
F. Apply number patterns (even and odd) and compare values of numbers on the hundred board. <u>PA Benchmark- Kindergarten</u> 2.8A Identify, describe and extend patterns based on shape, size, color, sound or number.	Differentiate between and/or give examples of even and odd numbers (limit to 3 digits). M3.A.1.1.2 Compare two whole numbers using greater than (>), lesser than (<), or equal to (=), (up through 9,999). M3.A.1.1.3	Investigations: <ul style="list-style-type: none"> • Pattern Trains and Hopscotch Paths • Manipulatives 	Formative: Routines Observations Summative: Pattern Assessment
G. Use concrete objects to count, order and group. <u>PA Benchmark- Kindergarten</u> 2.1E Use concrete objects to group into sets of ten. 2.1H Identify numbers before, after, and between 0 to 20. 2.11A Order whole numbers (0-20) from least to greatest.	Compare two whole numbers using greater than (>), lesser than (<), or equal to (=), (up through 9,999). M3.A.1.1.3	Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Manipulatives 	Formative: Routines Observations
H. Demonstrate an understanding of one-to-one correspondence <u>PA Benchmark- Kindergarten</u> 2.1C Represent equivalent forms of the same number through the use of concrete objects and drawings up to and including 20. 2.1F Use concrete objects to demonstrate understanding of one-to-one correspondence up to and including 20.		Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Manipulatives 	Formative: Routines Observations

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Standard: 2.1. Numbers, Number Systems and Number Relationships			
<p>I. Apply place-value concepts and numeration to counting, ordering and grouping.</p> <p><u>PA Benchmark- Kindergarten</u> 2.1G Count, read and write whole numbers 0 to 20.</p> <p>2.11A Order whole numbers (0-20) from least to greatest.</p>	<p>Order a set of whole numbers from least to greatest or greatest to least (up through 9,999; limit sets to no more than 4 numbers).M3.A.1.1.4</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • Handwriting Without Tears 	<p>Formative:</p> <p>Routines Observations</p>
<p>J. Estimate, approximate, round or use exact numbers as appropriate.</p> <p><u>PA Benchmark- Kindergarten</u> 2.2A Make estimates of objects in a set up to and including 20.</p> <p>2.2B Make an estimation and verify by counting.</p> <p>2.1I Estimate using concrete objects up to 100.</p>	<p>Estimate sums and differences of quantities: round two-digit numbers to the nearest 10, and three-digit numbers to the nearest 100, before computing (limit to 2 numbers). M3.A.3.2.1</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • Estimation Station 	<p>Formative:</p> <p>Routines Observations</p>
<p>K. Describe the inverse relationship between addition and subtraction.</p> <p><u>PA Benchmark- Kindergarten</u> 2.2E Separate concrete objects into equal groups.</p>	<p>Demonstrate the inverse relationship between addition and subtraction using fact families and/or factors.M3.A.2.1.2</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Supplemental Fraction Unit • Manipulatives 	<p>Formative:</p> <p>Routines Observations</p> <p>Summative:</p> <p>Fraction Assessment</p>

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Standard: 2.1. Numbers, Number Systems and Number Relationships			
L. Demonstrate knowledge of basic facts in four basic operations. Mastering Math Fact Families +/- facts to Set 5. Use strategies- +/-0 +/-1.	Solve problems involving multiplication through the 9's table through 9x5. M3.A.3.1.2	Investigations: <ul style="list-style-type: none"> • How Many In All? • Mastering Math Fact Families 	Formative: Routines Observations Summative: Math Fact Assessment

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Standard: 2.2. Computation and Estimation			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Computing numbers is based on the use of strategies and tools. • Students demonstrate good number sense when they can explain reasonableness of an answer. • Computing fluently involves knowing basic facts and understanding the number relationships. 		Essential Questions: <ol style="list-style-type: none"> 1. What strategies and tools are used to solve computation problems? 2. What strategies are used to identify reasonable estimates? 3. How do fact families help us understand basic operation problems? 	
A. Apply addition and subtraction in everyday situations using concrete objects. <u>PA Benchmark- Kindergarten</u> 2.2C Represent addition and subtraction in everyday situations using up to ten	Demonstrate the inverse relationship between addition and subtraction using fact families and/or factors. M3.A.2.1.2	Investigations: <ul style="list-style-type: none"> • How Many In All? • Evan-Moor: Daily Problem Solving • Read It! Draw It! Solve It! (Miller) • Manipulatives 	Formative: Routines Observations Summative: Computation Assessment Problem Solving Assessment
B. Solve single- and double-digit addition and subtraction problems with regrouping in vertical form. <u>PA Benchmark- Kindergarten</u> 2.2C Represent addition and subtraction in everyday situations using up to ten concrete objects. 2.2D Use concrete objects to explain the results of joining and separating sets of objects in quantities up to and including ten.	Solve single and double-digit addition and subtraction problems with and without regrouping in vertical and horizontal form. M3.A.3.1.1 Solve triple digit addition and subtraction problems without regrouping in vertical or horizontal forms. M3.A.3.1.3	Investigations: <ul style="list-style-type: none"> • How Many In All? • Evan-Moor: Daily Problem Solving • Read It! Draw It! Solve It! (Miller) • Manipulatives 	Formative: Routines Observations Summative: Computation Assessment Problem Solving Assessment

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Standard: 2.2. Computation and Estimation			
<p>C. Demonstrate the concept of multiplication as repeated addition and arrays.</p> <p><u>PA Benchmark- Kindergarten</u> 2.1A Count using whole numbers (to 100) by ones and tens (rote counting).</p> <p>2.2F Determine the sum of the same two one-digit numbers using concrete objects and/or pictures (3+3=6).</p>	<p>Represent multiplication as repeated addition. M3.A.2.1.1</p> <p>Solve problems involving multiplication through the 9's table through 9x5. M3.A.3.1.2</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • How Many In All? • Mastering Math Fact Families 	<p>Formative: Routines Observations</p> <p>Summative: Math Fact Assessment</p>
<p>D. Demonstrate the concept of division as repeated subtraction and as sharing.</p> <p><u>PA Benchmark- Kindergarten</u> 2.2E Separate concrete objects into equal groups.</p>		<p>Investigations:</p> <ul style="list-style-type: none"> • Supplemental Fraction Unit • Manipulatives 	<p>Formative: Routines Observations</p> <p>Summative: Fraction Assessment</p>
<p>E. Use estimation skills to arrive at conclusions.</p> <p><u>PA Benchmark- Kindergarten</u> 2.2A Make estimates of objects in a set up to and including 20.</p>	<p>Estimate sums and differences of quantities: round two-digit numbers to the nearest 10, and three-digit numbers to the nearest 100, before computing (limit to 2 numbers). M3.A.3.2.1</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • Estimation Station 	<p>Formative: Routines Observations</p>

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Standard: 2.2. Computation and Estimation			
F. Determine the reasonableness of calculated answers. <u>PA Benchmark- Kindergarten</u> 2.2B Make an estimation and verify by counting.		Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Estimation Station 	Formative: Routines Observations
G. Explain addition and subtraction algorithms with regrouping. NA			

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.3. Measurement and Estimation			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Measurement is part of our daily lives. • Reasonable estimations can be made about measurement and estimations can be verified. • Objects can be measured using non-standard measures. • Objects have various attributes that can be measured in different ways. • Different tools and units are used for measuring different attributes. Appropriate application of tools and units are needed for measurement.		Essential Questions: <ol style="list-style-type: none"> 1. How do we use measurement in our daily lives? 2. How can estimation help us when using measurement in our daily lives? 3. What strategies do we use to make reasonable estimations? 4. How do we verify estimations? 5. When and how do we use non-standard measures? 6. How can one object be measured in many ways? 7. How do units of measure differ? 8. Why is using the appropriate tool and measure important? 9. When do we use specific tools and specific units to measure? 	
A. Compare measurable characteristics of different objects on the same dimensions (e.g., time, temperature, area, length, weight, capacity, perimeter). <u>PA Benchmark- Kindergarten</u> 2.3B Compare two objects using direct comparison.	Compare and/or order objects according to length, area or weight. M3.B.1.2.2	Investigations: <ul style="list-style-type: none"> • Collecting, Counting • Measuring • Manipulatives 	Formative: Routines Observations Summative: Measurement Assessment
B. Determine the measurement of objects with non-standard and standard units (e.g., US customary and metric). <u>PA Benchmark- Kindergarten</u> 2.3D Determine the length and height of objects with non-standard units (e.g. hands/shoe lengths/jelly beans/paper clips).	Use a ruler (provided) to measure to the nearest ½ inch. M3.B.2.1.1	Investigations: <ul style="list-style-type: none"> • Collecting, Counting • Measuring • Manipulatives 	Formative: Routines Observations Summative: Measurement Assessment

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Standard: 2.3. Measurement and Estimation			
C. Determine and compare elapsed times. <u>PA Benchmark- Kindergarten</u> 2.3E Describe the instruments used for measuring time, length, weight, volume and temperature	Find elapsed time to increments of 5 minutes (limited to 2 adjacent hours). M3.B.1.1.2 Identify times of the day and night as AM and PM. M3.B.1.1.3	Investigations: <ul style="list-style-type: none"> • Collecting, Counting • Measuring • Manipulatives 	Formative: Routines Observations
D. Tell time (analog and digital) to the minute. <u>PA Benchmark- Kindergarten</u> 2.3E Describe the instruments used for measuring time, length, weight, volume and temperature.	Tell/show time (analog) to the minute. M3.B.1.1.1	Investigations: <ul style="list-style-type: none"> • Collecting, Counting • Measuring • Manipulatives 	Formative: Routines Observations Summative: Measurement Assessment
E. Determine the appropriate unit of measure. <u>PA Benchmark- Kindergarten</u> 2.3E Describe the instruments used for measuring time, length, weight, volume and temperature.	Select the appropriate unit for the attribute being measured. M3.B.1.2.1 Match the object with its approximate measurement (all measurements given must be of the same system, e.g., about How tall is a soda pop can? 5inches, 5 feet, 5 yards etc.). M3.B.2.2.1	Investigations: <ul style="list-style-type: none"> • Collecting, Counting • Measuring • Manipulatives 	Formative: Routines Observations Summative: Measurement Assessment

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Standard: 2.3. Measurement and Estimation			
F. Use concrete objects to determine area and perimeter. <u>PA Benchmark- Kindergarten</u> 2.3A Understand the spatial concepts of over, under, beside, in, out, around, on and between, above, top, bottom.		Investigations: <ul style="list-style-type: none"> • Supplemental Spatial • Relations Unit 	Formative: Routines Observations Summative: Spatial Relations Assessment
G. Estimate and verify measurements. <u>PA Benchmark- Kindergarten</u> 2.3C Estimate and measure objects using nonstandard units.	Use a ruler (provided) to measure to the nearest ½ inch. M3.B.2.1.1 Match the object with its approximate measurement (all measurements given must be of the same system, e.g., about How tall is a soda pop can? 5 inches, 5 feet, 5 yards etc.). M3.B.2.2.1	Investigations: <ul style="list-style-type: none"> • Collecting, Counting and • Measuring • Manipulatives 	Formative: Routines Observations Summative: Measurement Assessment
H. Demonstrate that a single object has different attributes that can be measured in different ways (e.g., length, mass, weight, time, area, temperature, capacity, perimeter). <u>PA Benchmark- Kindergarten</u> 2.3D Determine the length and height of objects with non- standard units (e.g. hands/shoe lengths/ jelly beans/paper clips).		Investigations: <ul style="list-style-type: none"> • Collecting, Counting and • Measuring • Manipulatives 	Formative: Routines Observations Summative: Measurement Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.4. Mathematical Reasoning and Connections			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Measurement is part of our daily lives. • Reasonable predictions can be made about measurement and predictions can be verified. 		Essential Questions: <ol style="list-style-type: none"> 1. How is measurement used in our daily lives? 2. What strategies do we use to make reasonable predictions? 3. How can we verify predictions? 	
A. Make, check and verify predictions about the quantity, size and shape of objects and groups of objects. <u>PA Benchmark- Kindergarten</u> 2.4A Use math vocabulary comparison terms when making predictions regarding the quantity, size, and shape of objects.		Investigations: <ul style="list-style-type: none"> • Collecting, Counting • Measuring 	Formative: Routines Observations Summative: Measurement Assessment
B. Use measurements in everyday situations (e.g., determine the geography of the school building). <u>PA Benchmark- Kindergarten</u> 2.4B Identify the use of measurement in everyday situations.		Investigations: <ul style="list-style-type: none"> • Collecting, Counting • Measuring 	Formative: Routines Observations Summative: Measurement Assessment

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 Grade 4

State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard:			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Appropriate application of number operations is needed to solve problems. • Solutions to problems can be communicated in a variety of ways. • Multiple strategies can be used to solve problems. 		Essential Questions: <ol style="list-style-type: none"> 1. How do we use pictures, numbers and words to communicate the solution to a problem? 2. How can a problem be solved in a different way? 	
A. Use appropriate problem-solving strategies (e.g., guess and check, working backwards). <u>PA Benchmark- Kindergarten</u> 2.5A Identify a problem and analyze possible solutions to determine which is most appropriate.		Investigations: <ul style="list-style-type: none"> • How Many In All? • Evan-Moor: • Daily Problem Solving • Read It! Draw It! Solve It! (Miller) 	Formative: Routines Observations Summative: Problem Solving Assessment
B. Determine when sufficient information is present to solve a problem and explain how to solve a problem. <u>PA Benchmark- Kindergarten</u> 2.5B Identify what information is needed to solve a problem.	Identify the correct operation (s) to solve a word problem (no more than two operations using +, - and/or \times). M3.A.2.1.3	Investigations: <ul style="list-style-type: none"> • How Many In All? • Evan-Moor: • Daily Problem Solving • Read It! Draw It! Solve It! (Miller) 	Formative: Routines Observations Summative: Problem Solving Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.5. Mathematical Problem Solving and Communication			
<p>C. Select and use an appropriate method, materials and strategy to solve problems, including mental mathematics, paper and pencil and concrete objects.</p> <p><u>PA Benchmark- Kindergarten</u> 2.5C Demonstrate various strategies to solve a problem.</p> <p>2.8E Use concrete objects or pictures to represent a number story that involves a missing addend.</p> <p>2.8F Explain how solutions are determined.</p> <p>2.8G Identify the purpose for different mathematical symbols (+, -, =).</p>	<p>Choose the number sentence that matches a given story (one operation, + or – only). M3.D.2.1.2</p> <p>Identify the correct operation (s) to solve a word problem (no more than two operations using +, - and/or x). M3.A.2.1.3</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • How Many In All? • Evan-Moor: Daily Problem Solving • Read It! Draw It! Solve It! (Miller) 	<p>Formative: Routines Observations</p> <p>Summative: Problem Solving Assessment Computation Assessment</p>

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.6. Statistics and Data Analysis			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • We use data in our daily lives. • Data can be collected and represented in a variety of ways. • Data is used to make decisions and form opinions. 		Essential Questions: <ol style="list-style-type: none"> 1. How do we use data in our daily lives? 2. How do we collect data? 3. What are representations? 4. How do we represent data on bar graphs and pictographs? 5. How can data help us make decisions and form opinions? 	
A. Gather, organize and display data using pictures, tallies, charts, bar graphs and pictographs. <u>PA Benchmark- Kindergarten</u> 2.6A Gather, organize and display data on a bar graph and/or a pictograph.	Analyze data shown on tables, charts, or bar graphs using the concepts of largest, smallest, most often, least often, middle. M3.E.1.1.1 Graph data or complete a graph given the data (grid is provided). M3.E.1.2.1 Translate information from one type of display to another (e.g., convert tally chart to bar graph). Limit to tally chart, bar graph and table. M3.E.1.2.2	Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment
B. Formulate and answer questions based on data shown on graphs. <u>PA Benchmark- Kindergarten</u> 2.6C Answer questions based on data shown on graphs or charts.	Describe, interpret and/or answer questions based on data shown in table, charts, or bar graphs. M3.E.1.1.2 Translate information from one type of display to another (e.g., convert tally chart to bar graph). Limit to tally chart, bar graph and table. M3.E.1.2.2	Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment

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Standard: 2.6. Statistics and Data Analysis			
<p>C. Predict the likely number of times a condition will occur based on analyzed data.</p> <p><u>PA Benchmark- Kindergarten</u> 2.6B Analyze a chart or graph that displays data and make a prediction.</p>		<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	<p>Formative: Routines Observations</p> <p>Summative: Graph Assessment</p>
<p>D. Form and justify an opinion on whether a given statement is reasonable based on a comparison to data.</p> <p><u>PA Benchmark- Kindergarten</u> 2.6D Use data from graphs to answer questions and form opinions.</p>		<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	<p>Formative: Routines Observations</p> <p>Summative: Graph Assessment</p>

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.7. Probability and Predictions			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Reasonable predictions can be made based on information given. • The probability or likelihood of an event can be predicted 		Essential Questions: 1. How do we make reasonable predictions?	
A. Predict and measure the likelihood of events and recognize that the results of an experiment may not match predicted outcomes. <u>PA Benchmark- Kindergarten</u> 2.7A State and explain the likelihood of an event using the terms: likely, unlikely, or certain		Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment
B. Design a fair and an unfair spinner. <u>PA Benchmark- Kindergarten</u> 2.7B Compare sets of data using the concepts of largest, smallest, most, and least Explain if an event is fair or unfair.		Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment
C. List or graph the possible results of an experiment. <u>PA Benchmark- Kindergarten</u> 2.7A State and explain the likelihood of an event using the terms: likely, unlikely or certain.	Translate information from one type of display to another (e.g., convert tally chart to bar graph). Limit to tally chart, bar graph and table. M3.E.1.2.2	Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.7. Probability and Predictions			
<p>D. Analyze data using the concepts of largest, smallest, most often, least often and middle.</p> <p><u>PA Benchmark- Kindergarten</u> 2.7B Compare sets of data using the concepts of largest, smallest, most, and least Explain if an event is fair or unfair.</p>	<p>Analyze data shown on tables, charts, or bar graphs using the concepts of largest, smallest, most often, least often, middle.</p> <p>M3.E.1.1.1</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	<p>Formative:</p> <ul style="list-style-type: none"> • Routines • Observations <p>Summative:</p> <ul style="list-style-type: none"> • Graph Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.8. Algebra and Functions			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> Numbers and operations utilize patterns, symbols and rules. Mathematical symbols have different meanings and help us determine how to solve a problem. Mathematical models can be used to understand and represent quantitative relationships. 		Essential Questions: <ul style="list-style-type: none"> How do patterns help us understand mathematical relationships? What do mathematical symbols ($-$, $+$, $=$) mean? How can mathematical symbols change the meaning of a number sentence? How are models used to represent quantitative relationships? How is a number sentence and the mathematical symbol related to a story problem? 	
A. Recognize, describe, extend, create and replicate a variety of patterns including attribute, activity, number and geometric patterns. <u>PA Benchmark- Kindergarten</u> 2.8A Identify, describe, and extend patterns based on shape, size, color, sound, or number.	Extend or find a missing element in a pattern of numbers or shapes (pattern must show three repetitions- if multiples are used, limit to 2, 3, 5). M3.D.1.1.1 Identify/describe the rule for a pattern shown (pattern must show three repetitions- if multiples are used limit to 2,3 or 5). M3.D.1.1.2	Investigations: <ul style="list-style-type: none"> Pattern Trains and Hopscotch Paths Manipulatives 	Formative: Routines Observations Summative: Pattern Assessment
B. Use concrete objects and trial and error to solve number sentences and check if solutions are sensible and accurate. <u>PA Benchmark- Kindergarten</u> 2.8D Use concrete objects and trial and error to represent a number story. 2.8G Identify the purposes for different mathematical symbols ($+$, $-$, and $=$)	Identify the missing symbol ($+$, $-$, $=$, $<$, $>$) that makes a number sentence true. M3.D.2.2.2	Investigations: <ul style="list-style-type: none"> How Many In All? Evan-Moor: Daily Problem Solving Read It! Draw It! Solve It! (Miller) 	Formative: Routines Observations Summative: Computation Assessment Problem Solving Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.8. Algebra and Functions			
<p>C. Substitute a missing addend in a number sentence.</p> <p><u>PA Benchmark- Kindergarten</u> 2.8E Use concrete objects or pictures to represent a number story that involves a missing addend.</p>	<p>Find a missing number that makes the number sentence true (one digit or two digit numbers up to 18 using +, - or x through 9×5). M3.D.2.2.1</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • How Many In All? • Evan-Moor: Daily Problem Solving • Read It! Draw It! Solve It! (Miller) • Manipulatives 	<p>Formative: Routines Observations</p> <p>Summative: Computation Assessment Problem Solving Assessment</p>
<p>D. Create a story to match a given combination of symbols and numbers.</p> <p><u>PA Benchmark- Kindergarten</u> 2.8C Recreate a simple story problem using concrete objects or pictures.</p>	<p>Create or match a story to a given combinations or symbols (+,-,x,<,>=) and numbers. M3.D.2.1.1</p> <p>Choose the number sentence that matches a given story (one operation + or - only). M3.D.2.1.2</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • How Many in All? • Evan-Moor: Daily Problem Solving • Read It! Draw It! Solve It! (Miller) • Manipulatives 	<p>Formative: Routines Observations</p> <p>Summative: Computation Assessment Problem Solving Assessment</p>
<p>E. Use concrete objects and symbols to model the concepts of variables, expressions, equations and inequalities.</p> <p><u>PA Benchmark- Kindergarten</u> 2.8B Use concrete objects to show equal or not equal.</p>	<p>Find a missing number that makes the number sentence true (one digit or two digit numbers up to 18 using +, - or x through 9×5). M3.D.2.2.1</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Mathematical Thinking • Manipulatives 	<p>Formative: Routines Observations</p> <p>Summative: Fraction Assessment</p>
<p>F. Explain the meaning of solutions and symbols.</p> <p><u>PA Benchmark- Kindergarten</u> 2.8G Identify the purpose for different mathematical symbols (+, - and =).</p>	<p>Identify the missing symbol (+, -, =, <, >) that makes a number sentence true. M3.D.2.2.2</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • How Many In All? 	<p>Formative: Routines Observations</p> <p>Summative: Computation Assessment</p>

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.8. Algebra and Functions			
G. Use a table or a chart to display information. <u>PA Benchmark- Kindergarten</u> 2.6A Gather, organize and display data on a bar graph and/or pictograph.		Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment
H. Describe and interpret the data shown in tables and charts. <u>PA Benchmark- Kindergarten</u> 2.6B Analyze a chart or graph that displays data and make a prediction.		Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment
I. Demonstrate simple function rules. <u>PA Benchmark- Kindergarten</u> 2.8G Identify the purposes for different mathematical symbols (+, -, and =).		Investigations: <ul style="list-style-type: none"> • How Many In All? 	Formative: Routines Observations Summative: Spatial Relations Assessment
J. Analyze simple functions and relationships and locate points on a simple grid. <u>PA Benchmark- Kindergarten</u> 2.3A Understand the spatial concepts of over, under, beside, in, out, around, on and between, above, top, bottom		Investigations: <ul style="list-style-type: none"> • Supplemental Spatial Relations Unit 	Formative: Routines Observations Summative: Spatial Relations Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.9. Geometry			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Our world is made up of two-dimensional shapes. • Two-dimensional shapes have attributes. • Spatial reasoning is used to solve problems. 		Essential Questions: <ol style="list-style-type: none"> 1. What two-dimensional shapes are found in our world? 2. What are the attributes of two-dimensional shapes? 3. How do shapes relate to each other? 4. What is symmetry? 	
A. Name and label geometric shapes in two and three dimensions (e.g., circle/sphere, square/cube, triangle/pyramid, rectangle/prism). <u>PA Benchmark- Kindergarten</u> 2.9A Identify common two and three-dimensional geometric shapes.	Name/identify/describe geometric shapes in two dimensions (circle, square, rectangle, triangle, pentagon, hexagon, octagon). M3.C.1.1.1 Name/identify geometric shapes in three dimensions (sphere, cube, cylinder, cone, pyramid, rectangular prism). M3.C.1.1.2	Investigations: <ul style="list-style-type: none"> • Making Shapes and Building Blocks 	Formative: Routines Observations Summative: Shape Assessment
B. Build geometric shapes using concrete objects (e.g., manipulative). <u>A Benchmark- Kindergarten</u> 2.9B Create and reproduce geometric designs using concrete objects. 2.9C Draw and/or construct two-dimensional geometric shapes.		Investigations: <ul style="list-style-type: none"> • Making Shapes and Building Blocks • Computer Program • Manipulatives 	Formative: Routines Observations Summative: Reproduce Design Assessment
C. Draw two- and three-dimensional geometric shapes and construct rectangles, squares and triangles on the geoboard and on graph paper satisfying specific criteria. <u>PA Benchmark- Kindergarten</u> 2.9C Draw and/or construct two-dimensional geometric shapes.	Name/identify/describe geometric shapes in two dimensions (circle, square, rectangle, triangle, pentagon, hexagon, octagon). M3.C.1.1.1 Name/identify geometric shapes in three dimensions (sphere, cube, cylinder, cone, pyramid, rectangular prism). M3.C.1.1.2	Investigations: <ul style="list-style-type: none"> • Making Shapes and Building Blocks • Manipulatives 	Formative: Routines Observations Summative: Shape Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.9. Geometry			
D. Find and describe geometric figures in real life. <u>PA Benchmark- Kindergarten</u> 2.9D Name and describe two-dimensional geometric shapes in real life.		Investigations: <ul style="list-style-type: none"> Making Shapes and Building Blocks 	Formative: Routines Observations Summative: Shape Assessment
E. Identify and draw lines of symmetry in geometric figures. <u>PA Benchmark- Kindergarten</u> 2.9E Explore symmetry in nature (leaves, butterflies).	Identify/draw one line of symmetry in a two dimensional figure. M3.C.2.1.1 Identify symmetrical two dimensional shapes. M3.C.2.1.2	Investigations: <ul style="list-style-type: none"> Making Shapes and Building Blocks Computer Program 	Formative: Routines Observations Summative: Symmetry Assessment
F. Identify symmetry in nature. <u>PA Benchmark- Kindergarten</u> 2.9E Explore symmetry in nature (leaves, butterflies).		Investigations: <ul style="list-style-type: none"> Making Shapes and Building Blocks Computer Program 	
G. Fold paper to demonstrate the reflections about a line. <u>PA Benchmark- Kindergarten</u> 2.9G Create a reflection.		Investigations: <ul style="list-style-type: none"> Making Shapes and Building Blocks 	
H. Show relationships between and among figures using reflections. <u>PA Benchmark- Kindergarten</u> 2.9F Identify a reflection.		Investigations: <ul style="list-style-type: none"> Making Shapes and Building Blocks 	

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.9. Geometry			
I. Predict how shapes can be changed by combining or dividing them. <u>PA Benchmark- Kindergarten</u> 2.9H Identify geometric shapes that are turned in different ways.		Investigations: <ul style="list-style-type: none"> • Making Shapes and Building Blocks • Computer Program • Manipulatives 	Formative: Routines Observations Summative: Triangle Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.10. Trigonometry			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> Triangles have characteristics that are both alike and different. 		Essential Questions: <ol style="list-style-type: none"> How are triangles alike? How are triangles different? 	
A. Identify right angles in the environment. <u>PA Benchmark- Kindergarten</u> 2.10A Identify triangles in the environment and discuss how they are alike and different.		Investigations: <ul style="list-style-type: none"> Making Shapes and Building Blocks 	Formative: Routines Observations Summative: Triangle Assessment
B. Model right angles and right triangles using concrete objects. <u>PA Benchmark- Kindergarten</u> 2.10A Identify triangles in the environment and discuss how they are alike and different.		Investigations: <ul style="list-style-type: none"> Making Shapes and Building Blocks 	Formative: Routines Observations Summative: Triangle Assessment

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.11. Concepts of Calculus			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Objects, time and data can be ordered based on their quantities. • Patterns and rules can help us order quantities. 		Essential Questions: <ol style="list-style-type: none"> 1. How can we order objects and quantities from least to greatest and greatest to least? 2. How can we determine missing numbers on a hundreds board? 3. How can we use a pattern to complete a series of numbers? 	
A. Identify whole number quantities and measurements from least to most and greatest value. <u>PA Benchmark- Kindergarten</u> 2.11A Order whole numbers (0-20) from least to greatest value.	Order a set of whole numbers from least to greatest or greatest to least (through 9,999; limit sets to no more than 4 numbers). M3.A.1.1.4	Investigations: <ul style="list-style-type: none"> • Mathematical Thinking 	Formative: Routines Observations
B. Identify least and greatest values represented in bar graphs and pictographs. <u>PA Benchmark- Kindergarten</u> 2.6C Answer questions based on data shown on graphs or charts.	Analyze data shown on tables, charts or bar graphs using the concepts of largest, smallest, most often, least often and middle. M3.E.1.1.1	Investigations: <ul style="list-style-type: none"> • Mathematical Thinking • Counting Ourselves and Others 	Formative: Routines Observations Summative: Graph Assessment
C. Categorize rates of change as faster and slower. <u>PA Benchmark- Kindergarten</u> 2.11B Identify situations that occur in real life that are slow or fast in happening.		Investigations: <ul style="list-style-type: none"> • Collecting, Counting and Measuring 	Formative: Routines Observations

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	Instructional Strategies and Resources	Assessments
Standard: 2.11. Concepts of Calculus			
<p>D. Continue a pattern of numbers or objects that could be extended infinitely.</p> <p><u>PA Benchmark- Kindergarten</u> 2.8A Identify, describe, extend patterns based on shape, size, color, sound or number.</p>	<p>Extend or find a missing element in a pattern of numbers or shapes (pattern must show three repetitions- if multiples are used, limit to 2, 3, 5). M3.D.1.1.1</p> <p>Identify/describe the rule for a pattern shown (pattern must show three repetitions- if multiples are used limit to 2, 3 or 5). M3.D.1.1.2</p>	<p>Investigations:</p> <ul style="list-style-type: none"> • Pattern Trains and Hopscotch Paths • Manipulatives 	<p>Formative: Routines Observations</p> <p>Summative: Pattern Assessment</p>

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