Fairfield Public Schools Mathematics Curriculum

Preschool

Preschool Mathematics

Mathematically rich preschool classes are joyful, busy places where children develop relationships, explore, negotiate, and learn. Through their years in preschool, young children are exposed to and explore the power of mathematics in helping shape their world and build relationships. Mathematical learning depends on more than teaching rote numbers. Mathematics and numeracy are tools for thinking, problem solving, and communicating.

The preschool curriculum allows children to learn how mathematics helps build a community of learners through thoughtfully planned numeracy work that exposes children to the components of mathematics: counting and cardinality, operations and algebraic thinking, numbers and operations, measurement and data, and geometry.

The standards addressed in preschool can be directly linked to the standards that will be addressed in kindergarten. The curriculum guide demonstrates how the important work in preschool classes helps lay the groundwork for further mathematical learning as they enter kindergarten.

Learning Guide

Foundations for Learning in a Mathematical Community	Supporting Emergent Mathematicians

Mathematics Resources
- *The Creative Curriculum for Preschool Kai-lee Berke et al., Teaching Strategies, Wahington D.C., 2010*
- *Literacy Beginnings: A Pre-Kindergarten Handbook (2011) by G. S. Pinnell & I. Fountas*
- *CT Preschool Curriculum Frameworks*
- *CT Preschool Assessment Frameworks*
- *Common Core State Mathematics Standards*

Preschool Overview		
Central Understandings: Students will – • Use number concepts and operations to count, quantify and connect numerals with their quantities • Understand and describe spatial relationships and shapes • Compare and measure • Demonstrate knowledge of patterns in number relationships • Engage in inquiry	**Essential Questions** 1. How do we engage preschoolers in rich discussions about mathematics in large groups, small groups, and individually? 2. How do we provide experiences for preschoolers to compare, connect, and respond to in our daily routines and in mathematical problems? 3. How do we provide preschoolers the opportunity to apply meaningful applications of mathematics in large groups, small groups, and individually? 4. How do we promote discussions around a variety of high-interest, relevant, real-world experiences to build conceptual understanding? 5. How does exposure to new vocabulary build understanding of our world? 6. How does learning about number relationships, in context, help us prepare to be better mathematicians? 7. How do activities (e.g. singing songs & rhymes) help develop pattern and number relationships? 8. How do we provide preschoolers with ample time to engage in problem solving? 9. How do we provide preschoolers ample time to engage and inquire in mathematical conversations with peers and adults?	**Assessments** *Universal Assessments* *Counting* *Cardinality*

Content Outline: • Foundations for Learning in a Mathematical Community • Supporting Emergent Mathematicians	**Preschool Thread for the Year:** Together and individually explore and use the elements of numeracy to build and share understanding and meaning. **Standards:** • CT Preschool Curriculum Framework (PCF) • CT Preschool Assessment Framework (PAF) • Common Core State Mathematics Standards

Foundations for Learning in a Mathematical Community

Overview

Preschoolers are excited to be part of a new learning community. Each child arrives at school with a different set of backgrounds and understandings. Specific activities designed to capitalize on a young child's natural curiosity provide opportunities to explore and use mathematics and foster deeper understanding of number and number concepts.

The preschool curriculum affords children the opportunity to use language, mathematical thinking and problem solving in a variety of settings and tasks. A comprehensive, well-planned mathematics program addresses the components and processes of mathematics, and the classroom environment and materials. It also takes into account the children's abilities, interests and learning styles.

Preschool Big Ideas

- School is a place where people work, talk, and play together.
- You can learn many new things about your world at school.
- You can talk to show your thinking.
- A mathematically rich environment stimulates children's thinking
- Mathematics plays an important role in young children's learning.
- Children's mathematical thinking expands as they interact with a variety of people.
- Children learn more about how to use mathematical mathematics in work and play.

Math Standards

- P & S 1. Shows self-direction
- P & S 2. Sustains attention
- P & S 3. Participates in groups
- P & S 7. Cooperates with peers
- PHY 1. Uses large muscles
- PHY 2. Uses small muscles
- COG 8. Uses sentences
- COG 9. Understands conversations
- CRE 1. Builds and constructs
- CRE 2. Draws and paints

Mathematical Practices
PK.MP.1 Make sense of problems and persevere in solving them
PK.MP.2 Reason quantitatively
PK.MP.3 Construct viable arguments, justify reasoning and explain the reasoning of others
PK.MP.4 Model in mathematics
PK.MP.5 Use appropriate tools strategically
PK.MP.6 Attend to precision
PK.MP.7 Look for and make use of structure in the environment and in routines
PK.MP.8 Look for and express regularity in repeated reasoning

Supporting Emergent Mathematicians
Overview
Preschoolers are excited to be part of a new learning community. Each child arrives at school with a different set of backgrounds and understandings. Specific activities designed to capitalize on a young child's natural curiosity provides opportunities to explore and use mathematics and numeracy in multiple settings and activities. These routines expose students to oral language and problem solving tasks in real-world contexts that foster deeper understanding of number and number concepts. Through the use of common routines and rituals, students learn to use mathematical language as they participate in various learning activities using numeracy. The preschool curriculum affords children the opportunity to use language and mathematical thinking in a variety of settings and tasks. A comprehensive, well-planned mathematics program addresses the components and processes of mathematics, and the classroom environment and materials. It also takes into account the children's abilities, interests and learning styles.

Preschool Big Ideas
- Language plays an important role in young children's learning.   - Children use language in different ways: narrative, explaining and seeking information, oral performance and giving and understanding directions.   - Children's language expands as they interact with a variety of people.   - Children learn more about how to use language conventionally as they utilize language in work and play.   - A child's vocabulary expands through conversation, particularly about texts that have been read aloud.

Mathematics Standards	
- P & S 1. Shows self-direction - P & S 2. Sustains attention - COG 1. Engages in scientific inquiry - COG 2. Uses a variety of strategies to solve problems - COG 3 Sorts Objects - COG 4 Recognize and makes patterns - COG 5 Compares and orders objects and events - COG 6 Relates number to quantity - COG 7 Demonstrates spatial awareness - CRE 1. Builds and constructs - CRE 2. Draws and paints	**Counting and Cardinality** PK.CC.1 Associate quantities and the names of numbers with written numerals PK.CC.2 Recognize the number of objects in small groups without counting (subitizing) PK.CC.3 Know number names and the count sequence PK.CC.4 Count a set of objects to tell "how many" using one-to-one correspondence PK.CC.5 Compare two numbers (quantities) within ten **Number Operations** PK.NBT.1 Compose and decompose numbers (ex. twelve is ten and two) PK.NBT.2 Recognize numbers are contained in other numbers (hierarchical inclusion: four is in five and five is one more than four) PK.NBT.3 Recognize that numbers can be combined and separated, (ex. When you add two more to a group of three you have 5) **Measurement and Data** PK.MD.1 Describe and compare measurable attributes PK.MD.2 Sort and classify objects by attributes **Geometry** PK.G.1 Recognize and describe shapes in the environment PK.G.2 Analyze and compare shapes PK.G.3 Combine shapes to make other shapes PK.G.4 Describe the location and relative position of objects
Assessments and Progress Indicators *Counting *Cardinality	

Links to Kindergarten Common Core Mathematical Practice Standards	
Kindergarten Standards for Mathematical Practice The K-12 Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. This page gives examples of what the practice standards look like at the specified grade level.	
Standards	*Explanations and Examples*
Students are expected to: **1. Make sense of problems and persevere in solving them**.	In Kindergarten, students begin to build the understanding that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" or they may try another strategy.
Students are expected to:. **2. Reason abstractly and quantitatively.**	Younger students begin to recognize that a number represents a specific quantity. Then, they connect the quantity to written symbols. Quantitative reasoning entails creating representation of a problem while attending to the meanings of the quantities.
Students are expected to: **3. Construct viable arguments and critique the reasoning of others.**	Younger students construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also begin to develop their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
Students are expected to: **4. Model with mathematics.**	In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
Students are expected to: **5. Use appropriate tools strategically.**	Younger students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, kindergarteners may decide that it might be advantageous to use linking cubes to represent two quantities and then compare the two representatives side-by-side.
Students are expected to: **6. Attend to precision.**	As kindergarteners begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning.
Students are expected to: **7. Look for and make use of structure.**	Younger students begin to discern a pattern or structure. For instance, students recognize the pattern that exists in the teen numbers; every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated. They also recognize that $3 + 2 = 5$ and $2 + 3 = 5$.
Students are expected to: **8. Look for and express regularity in repeated reasoning**.	In the early grades, students notice repetitive actions in counting and computation, etc. For example, they may notice that the next number in a counting sequence is one more. When counting by tens, the next number in the sequence is "ten more" (or one more group of ten). In addition, students continually check their work by asking themselves, "Does this make sense?"

Links to Kindergarten Common Core State Standards

Know number names and the count sequence.

K.CC.1. Count to 100 by ones and by tens.
K.CC.2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

K.CC.3. Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).

Count to tell the number of objects.

K.CC.4. Understand the relationship between numbers and quantities; connect counting to cardinality.
    a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.
    b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.
    c. Understand that each successive number name refers to a quantity that is one larger.

K.CC.5. Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.

Compare numbers.

K.CC.6. Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.[1]

K.CC.7. Compare two numbers between 1 and 10 presented as written numerals.

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings[1], sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

K.OA.3. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., $5 = 2 + 3$ and $5 = 4 + 1$).

K.OA.4. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.

K.OA.5. Fluently add and subtract within 5.

Work with numbers 11-19 to gain foundations for place value.

K.NBT.1. Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as $18 = 10 + 8$); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

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Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

K.G.2. Correctly name shapes regardless of their orientations or overall size.

K.G.3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Analyze, compare, create, and compose shapes.

K.G.4. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

K.G.6. Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*