MATHEMATICS
BEST PRACTICES

Introduction

Young children need ongoing opportunities to develop their mathematical thinking. In addition to daily opportunities for independent choice and exploration, preschool classroom time should be regularly allotted for in depth, small group math experiences that encourage children to interact, pursue problem solving strategies and reflect. Teachers should facilitate a supportive learning environment by continuously observing, listening and scaffolding children's mathematical thinking in everyday contexts. Teachers should also recognize and plan short- and long-term projects based on the strong opportunities for mathematical thinking and problem solving that occurs when mathematics is combined with other curriculum content areas.

Children begin to demonstrate an understanding of number and counting.

Preschool Teaching Practices
Preschool teachers will:

- Encourage and support attempts to learn to count numbers to 20 or higher.
- Include and refer by name to written numbers in the classroom environment during daily routines and in the context of large and small group experiences.
- Intentionally refer to the symbol and number name when discussing numbers (quantities) of objects.
- Provide manipulatives and materials (e.g., print and digital material, sand molds, tactile numeral cards, puzzles, counting books, hand-held devices such as tablets, interactive whiteboards) and activities (e.g. tracing numbers in sand, forming numbers with clay, recording data) that feature number names and number quantities.
- Provide a wide variety of writing materials for children to informally explore writing numbers along with meaningful contexts for children to write numbers on charts and graphs.
- Make materials and books that promote exploration of number quantities (e.g., collections of small objects, cash registers with money, number puzzles, counting books and games in print and digital formats, egg cartons and plastic eggs) accessible to children.
- Integrate purposeful counting experiences throughout the school day, indoors and outdoors (e.g., taking attendance, following the rule to stay three steps behind another person, climbing the ladder of the slide, pulling the paper towel holder lever twice. Play board games that involve arranging and counting objects and identifying small quantities of objects with small groups of children).

- Encourage children to compare numbers frequently through questions (e.g., “Are there more people riding in the bus or in the airplane?”) and graphing (e.g., favorite colors, pets).

- Foster one-to-one correspondence throughout the day (e.g., ask a child to put out just enough bowls and spoons for each stuffed animal seated at the table, ask a child to arrange just enough cars so that each garage space has one car in it).

- Model how to represent and describe data (e.g., display daily attendance on a graph and discuss “how many,” “more,” “less,” “fewer,” “equal to.”).

- Work with children in small groups to help them organize (classify) objects, describe their work, and represent the results (e.g., children use a series of graphs to represent the results of experiences in sorting buttons by various attributes – size, color, number of holes, etc.).

Children demonstrate an initial understanding of numerical operations.

Preschool Teaching Practices
Preschool teachers will:

- Model addition for children by using counting to combine numbers (e.g., “Maria has two blocks and Justin has three. There are five blocks altogether: 1, 2, 3, 4, 5.”).

- Model subtraction for children by using counting to separate quantities of objects (e.g., “There are five cars on the carpet: 1, 2, 3, 4, 5. I am putting two cars in the basket. There are three cars left on the carpet.”).

- Engage informally with children during center time to explore joining and taking apart small quantities of concrete objects.

- Provide opportunities for children to independently explore addition and subtraction (e.g., using small manipulatives with egg cartons, muffin tins and story mats; interacting with children using computer software and handheld device applications).

- Develop addition and subtraction stories with small groups of children using story mats and flannel board scenes with small quantities of objects and pictures/drawings.

- Using fingers, chalk, wipe-off markers and/or whiteboard technology, tell and draw addition and subtraction stories with small groups of children.

- Provide writing materials and/or handheld devices with appropriate applications in classroom centers so that children can choose to view, solve and create addition and subtraction stories.

Children begin to conceptualize measurable attributes of objects.

Preschool Teaching Practices
Preschool teachers will:

- Provide standard and nonstandard measurement materials both indoors and outdoors (e.g., unit blocks, inch cubes, rulers, cups, buckets, balance scales, water and sand tables).
- Invite children to compare and order objects according to measurable attributes (e.g., length, height, weight, area).
- Listen for and extend children's conversations about long and short, longer and shorter, short and tall, shorter and taller, etc.
- Provide materials for children to sort, classify, order, and pattern (e.g., buttons, beads, colored craft sticks, bowls, trays).
- Use digital photography to record children's measurement activities so that students can revisit, think more about, and discuss their strategies with adults and classmates.

Children develop spatial and geometric sense.

Preschool Teaching Practices
Effective preschool teachers:

- Use positional words (e.g., over, under, behind, in front of) to describe the relative position of items and people, and encourage the children to use them (e.g., "Michael is sitting next to Ana." "I see that you used yellow paint under the blue stripe on your painting." "Are you in front of or behind me?" "The car is on the right.").
- Dramatize stories that make use of positional words (e.g., *Rosie's Walk* by Pat Hutchins).
- Use everyday experiences to foster understanding of spatial sense (e.g., talk about locations in the school, map the classroom by learning/interest area, invite children to use blocks to create simple scenes or locations [e.g., the park, the zoo] ask children to describe and/or draw how to get from the classroom block area to the easel).
- Provide materials that can be put together and taken apart indoors and outdoors that help children to develop spatial and geometric sense (e.g., puzzles of varying complexity, items to fill and empty, fit together and take apart, or arrange and shape; materials that move; tunnels to crawl through).
- Introduce vocabulary describing two- and three-dimensional shapes and constructions (e.g., circle, sphere, square, cube, triangle, rectangular prism, pyramid; side, point, angle) and use that vocabulary when interacting with children and materials in learning centers, small groups, and individual settings.
- Provide opportunities for children to compose and decompose pictures and designs with two-dimensional shapes (e.g., tangrams, in collage arrangements, two-dimensional manipulative shapes, computer and interactive whiteboard software, handheld device [such as a tablet] applications).

- Provide opportunities for children to compose and decompose with three-dimensional shapes (e.g., unit blocks, hollow blocks, three-dimensional manipulative shapes, boxes, balls, three-dimensional styrofoam shapes).

- Provide opportunities for children to talk about their two- and three-dimensional designs with other children and with adults.

- Provide opportunities for children to explore and describe the differences and similarities between attributes of two- and three-dimensional shapes (e.g., “It’s like a can.” “It has 3 sides and 3 points, so it’s a triangle.”) and constructions (e.g., faces of attribute blocks, balls, blocks of all shapes, boxes, beads).