

Mathematics

- Number and Operations
- Spatial Sense

- Patterns and Measurement

Very young children develop mathematical concepts through meaningful and active learning experiences that are broader in scope than numbers and counting.

In an inclusive, developmentally appropriate, play-based environment, infants and toddlers have opportunities to acquire and understand math-related skills and concepts using hands-on materials during play activities and in real-life situations.

These activities can help facilitate the concepts of quantity, time, and space. Adults must be flexible during daily routines and try to capture teachable moments to describe comparison concepts.

Adults must also facilitate activities that build upon young children's existing skills based on their curiosity and enthusiasm for the objects in their environment.



Strategies to support inclusive learning environments:

- ❖ Simplify a complicated task by breaking it into smaller parts or reducing the number of steps
- ❖ Use shorter but more frequent activities and routines

Some general accommodations to support children with special learning or developmental needs can be found on page 9 of this document, and in NDE Rule 51.

Number and Operations

Infants (Birth to 18 Months)

Widely Held Expectations

- Child begins to develop awareness of quantity
 - Explores a variety of materials
 - Puts toys into containers of various sizes
- Child begins to show interest in real life mathematical concepts
 - Understands the concept of "more" in reference to food or play
- Child begins to imitate counting using some names of numbers

Learning in Action: Examples

The Infant

- Indicates preferences (more crackers, no more milk, more music, wants to get down, etc.)
- Experiments with quantities and space (stacks blocks, fills containers, dumps objects, etc.)
- Manipulates similar objects (blocks, large beads, etc.) that are large enough not to be a choking hazard

The Adult

- Describes child's activities using words related to quantity (one, more, another, etc.)
- Exposes child to numbers and number concepts in pictures, books and songs
- Provides materials to explore and manipulate that are large enough not to be a choking hazard
- Models counting objects in child's environment

THE ENVIRONMENT INCLUDES

- Materials available and accessible within the daily routine for manipulation and exploration (rattles, blocks, stacking rings, etc.)
- Materials that provide examples and encourage use of numbers (books, pictures, toys, etc.)

Number and Operations

Toddlers (18 Months to 3 Years)

Widely Held Expectations

- Child develops numeral awareness
 - Counts up to five
 - Uses one to one correspondence
 - Understands quantities up to 3
- Child develops an understanding of the counting process
 - Uses counting words
 - Imitates counting rhymes or songs

Learning in Action: Examples

The Toddler

- Counts in nursery rhymes or songs ("Three Little Monkeys", "One Two Buckle My Shoe", etc.)
- Places object in 1 to 1 correspondence within play activities and routines (hands each child a cup, places a pretend cookie on each plate, etc.)
- Compares the quantities of small groups of objects, (all, some, none, more, less, etc.)
- Counts to five or higher from memory (recites one, two, three...)
- Identifies a single puzzle piece as "one"

The Adult

- Provides counting finger plays, books, songs and other activities and materials throughout the daily routine and program
- Provides opportunities for children to pair objects, to count, and to develop and practice using number words
- Uses descriptive words throughout the day (before, after, later, etc.)

THE ENVIRONMENT INCLUDES

- Materials available and accessible within the daily routine for sorting and counting (blocks, large beads, magnetic shapes, etc.)
- Objects that include numbers and number words (clocks, play cash register, measuring cups, etc.)

Spatial Sense

Infants (Birth to 18 Months)

Widely Held Expectations

- Child begins to develop knowledge of where things are in the environment
 - Explores materials
 - Experiments with gravity and space
- Child develops sense of self in relation to the environment

Learning in Action: Examples

The Infant

- Visually follows movement of objects and people
- Gazes at own hands as they move about, waves arms to touch the dangling toy overhead, etc.
- Explores materials by using different actions with toys (shakes rattles, slides cars, rolls balls, etc.)
- Explores space by moving self over, under, through, in and around various objects and spaces
- Experiments with gravity (stacks 2-3 blocks, dangles objects on rings, drops objects off tray, etc.)
- Explores materials by pointing and poking

The Adult

- Provides experiences with toys with different properties (mobiles, squeaky toys, bells, toys with moving parts, cars, etc.)
- Provides blocks, empty boxes, tubes and containers for children to use in creating and constructing
- Uses descriptive words related to spatial concepts (over, under, more, less, etc.)
- Provides large boxes and climbing equipment for children to explore the physical space
- Takes children outside to explore nature and neighborhood

THE ENVIRONMENT INCLUDES

- A variety of materials to explore space (blocks, containers, rattles, activity boxes, etc.)
- Time and space to explore both indoors and outdoors

Spatial Sense

Toddlers (18 Months to 3 Years)

Widely Held Expectations

- Child develops knowledge of where things are in the environment
 - Begins to recognize buildings, stores, signs, parks, etc.
- Child develops geometry and spatial sense
 - Uses comparison words correctly (more, less, bigger, smaller, etc.)
 - Uses words that describe the relative position of things (close, far, up, down, etc.)
 - Learns about shapes (circle, square, triangle, etc.)
- Child groups objects together that are the same in some way
- Child uses language to demonstrate understanding of space and time (next to, on top of, in, etc.)

Learning in Action: Examples

The Toddler

- Matches and sorts objects of different sizes and shapes
- Stacks objects and completes structures using a variety of different blocks
- Fills and dumps a variety of containers with different materials
- Moves through obstacle course (climbing over, under, through, around, in, out, etc.)

The Adult

- Provides a variety of puzzles to encourage children to problem-solve and to make comparisons (single and multiple piece puzzles, shape sorters, etc.)
- Provides experiences with different sizes and shapes of objects
- Provides blocks, empty boxes, tubes and containers for children to use in creating and constructing
- Uses descriptive words related to spatial concepts (over, under, more, less, etc.)
- Provides large boxes and climbing equipment for children to explore the physical space
- Takes children outside to explore nature and neighborhood

THE ENVIRONMENT INCLUDES

- A variety of materials to explore space (blocks, boxes, puzzles, containers etc.)
- Time and space to explore both indoors and outdoors

Patterns and Measurement

Infants (Birth to 18 Months)

Widely Held Expectations

- Child begins to create own patterns of self-regulation for sleeping, eating and wakeful play
- Child begins to demonstrate awareness of patterns, first visually, then through manipulation
 - Plays with toys and objects of different sizes and shapes
 - Orders a few objects by size, with assistance
- Child begins to understand time words (after, before, etc.)

Learning in Action: Examples

The Infant

- Shows visual interest in contrasting colors, patterns, textures
- Begins to recognize time sequences ("After we change your diaper, we will read a story," etc.)
- Manipulates objects in a variety of ways to learn about their properties
- Uses simple nesting or stacking toys (nests two to three cups, stacks three to four blocks of graduated size, etc.)

The Adult

- Provides interesting materials for child to look at and play with (posters, stuffed animals, books, mirrors, pictures, balls, etc.)
- Talks about the child's activities using descriptive language related to patterns, and size, etc.
- Provides toys that have incremental sizes (nesting cups, stackable rings, etc.)

THE ENVIRONMENT INCLUDES

- Materials of various sizes, colors, textures, and shapes that can be manipulated in a variety of ways (blocks, snap beads, shape sorter, etc.)
- Mobiles, mirrors, visual patterns, etc.

Patterns and Measurement

Toddlers (18 Months to 3 Years)

Widely Held Expectations

- Child begins to develop knowledge of patterns
 - Begins to complete simple puzzles with varying sizes and shapes
- Child begins to demonstrate knowledge of measurement concepts
 - Understands concepts of big/little, short/tall, heavy/light
- Child shows some understanding of time sequence within the daily routine
- Child compares the size of various everyday objects (puts different people's shoes side by side to see which is longest, etc.)

Learning in Action: Examples

The Toddler

- Matches like objects, shapes and colors
- Completes puzzles with pieces of varying sizes and shapes
- Fills and empties containers (with sand or water, etc.)
- Recognizes times in daily routine (time to eat, time to go home, group time, nap time, etc.)
- Describes objects in play using size concepts, (talks about the tall tree on a walk to park, describes big dog, little kitty, etc.)
- Explores measuring tools (measuring cup, ruler, scale, etc.)

The Adult

- Engages in conversations with children about size comparisons as they interact with materials throughout the day
- Helps children see similarities and differences in objects
- Provides a variety of puzzles with different sizes and shapes
- Charts child's changes in height and weight
- Provides sand and water play, giving child opportunities to pour, fill, scoop, weigh, count, dump, etc.

THE ENVIRONMENT INCLUDES

- Materials of various sizes, colors, textures, and shapes (blocks, beads, peg boards, matching games, etc.)
- Opportunities for indoor/outdoor sand and water play
- Posted daily schedule done in both pictures and words

Resources

Creative Resources for the Early Childhood Classroom (4th Edition) -- Judy Herr

Everyday Discoveries: Amazingly Easy Science and Math Using Stuff You Already Have -- Sharon MacDonald

Learning Through Play: Math-A Practical Guide -- Sandra Waite-Stupiansky and Nicholas G. Stupiansky

Math for the Very Young: A Handbook of Activities for Parents and Teachers -- Lydia Polonsky, Dorothy Freedman, Susan Leshner, and Kate Morrison

Showcasing Mathematics for the Young Child: Activities for Three, Four and Five Year Olds -- Juanita Copely (Editor)

Mathematics

Books for Children

Anno's Counting Book -- Mitsumasa Anno

Baby Minds: Brain-Building Games Your Baby Will Love -- Linda Acredolo and Susan Goodwyn

Baby Play and Learn -- Penny Warner

Catch Me & Kiss Me & Say It Again -- Wendy Watson and Clyde Watson

Five Little Monkeys Jumping On The Bed -- Eileen Christelow

Hand Rhymes -- Marc Tolon Brown

Read Aloud Rhymes for the Very Young -- Jack Prelutsky

Ten, Nine, Eight -- Molly Bang

Two Shoes, New Shoes -- Shirley Hughes