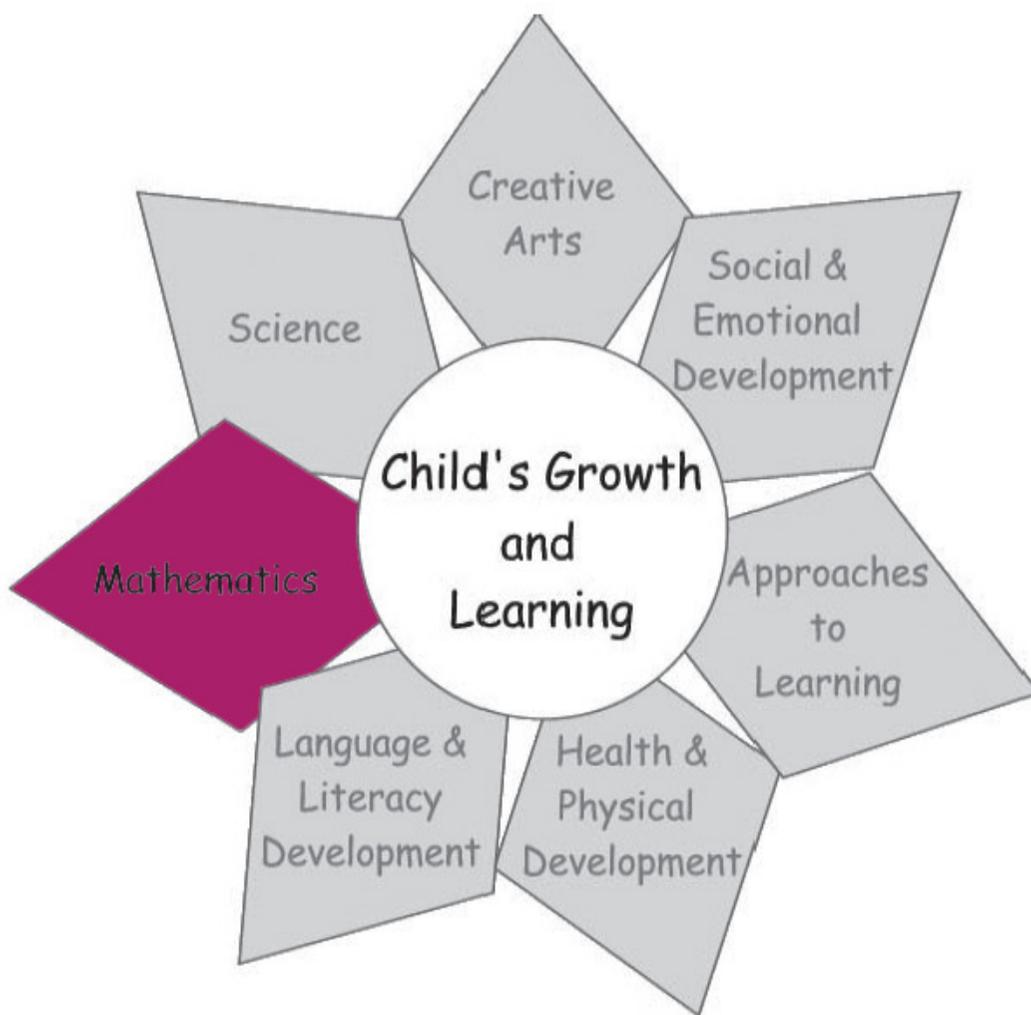


Nebraska Early Learning Guidelines for Ages 3 to 5



Mathematics

Number and Operations M.01

Geometry and Spatial Sense M.02

Patterns and Measurements M.03

Young children develop number and mathematical concepts through meaningful and active learning experiences that are broader in scope than numerals and counting. In an inclusive, developmentally appropriate play-based environment, preschool children have opportunities to acquire and understand mathematical skills and concepts using hands-on materials and use of numbers in real-life situations.

Early childhood teachers and caregivers must be flexible during daily routines and try to capture teachable moments using open-ended questions to expand mathematical concepts. Adults must also plan activities that build upon young children's existing skills based on their curiosity and enthusiasm for the objects in their environment.



Number and Operations (M.01)

Widely Held Expectations

- Child develops awareness of number and numerals
 - Uses one-to-one matching (correspondence)
 - Distinguishes between numbers and letters
 - Identifies written numerals
- Child uses language to demonstrate understanding of space and time (next to, on top of, before, after)
 - Begins to learn sequences of events in time (first, next, last)
- Child develops an understanding of the counting process
 - Counts, in order, up to ten or higher
 - Counts all types of objects; plays with counting forward or backward
 - Can judge whether groups of up to five objects contain the same number of objects



Learning in Action: Examples

The Child:

- Compares quantities of small groups of objects, using words like more/less, some/all
- Recognizes numerals, points to each object when counting, assigning the correct number
- Uses words such as yesterday, today, and tomorrow in conversation
- Counts in nursery rhymes and finger plays
- Identifies new quantities when changes are made (combining or separating)
- Uses numbers daily by describing their learning experiences and through problem solving

The Adult:

- Offers counting materials and activities throughout the day, such as number puzzles, books, finger plays, songs, computer software with counting games, and sand timers
- Provides opportunities for children to pair objects, to count both common things (blocks) and silly things (freckles on their arms), and to develop and practice using number words
- Uses descriptive words throughout the day such as yesterday, tomorrow, before, and after
- Gives children opportunities to practice grouping objects and comparing quantities

The Environment Includes:

- Materials available within the daily routine for sorting, comparing and counting (small blocks, colored bears, magnetic shapes, large beads and counters, Velcro and magnetic blocks, pegboards)
- Shallow containers for children to use materials while keeping the pieces together
- Variety of places for children to use materials (table, vertical or slanted surfaces)
- Objects that include numbers and number words (clocks, timers, calendars, thermometers, calculators, measuring cups, number lines, etc.)
- Games that encourage children to identify numbers and use numbers in problem solving

Strategies to Support Number and Operations

Teaching with Intent Throughout the Day:

- Write, “How many of the smaller containers of water will fit in the larger container?” on the top of a chart. List the children’s names down the side and document the guesses after each name. Reflect on the results after the experiment is conducted.
- Use self-talk (saying what you are thinking or doing). “I am going to give each of you five crackers. I am opening the box... now I am handing the crackers out, one to each person, now two to each person... Now let’s see, did everyone get five? Yes! I handed out five crackers to everyone.”
- Offer materials and games that convey the concept of number such as dominoes and dice. Ask children, “Can you find another domino with the same (more, less) number of dots?”
- Pose simple problems, such as “We have 8 children in our group but 2 are gone. How many plates do we need for lunch?”

Supporting Children with a Wide Range of Abilities:

- Provide adaptations to help children grasp items. For example, build up handles with sponges or foam tape, stabilize toys on surfaces with C-clamps, attach Velcro to small manipulatives, and attach knobs or handles to puzzle pieces.
- Use picture communication board to allow children to make choices, answer questions and express observations when communicating about amounts and numbers.
- Modify games using large dice, spinners with a handle to spin, or a switch that encourage children to identify and use numbers in problem solving.

Supporting English Language Learners:

- Encourage hands-on and sensory experiences such as touching, holding, exploring, tasting, smelling and manipulating as children learn about numbers and counting.
- Use number names from multiple languages when talking about quantity and counting.
- Teach number and operations words (today, tomorrow, yesterday, more, less) in both the home language and English with the help of an interpreter.

Supporting Children from a Variety of Cultures:

- Lead discussions of similarities and differences among different cultures to help children understand and appreciate diversity and to develop of sense of community. For example, everyone uses numbers to count but it may sound different and look different.
- Include a variety of cultures and physical characteristics in visual representations of things to count and quantify.

Geometry and Spatial Sense

(M.02)



Widely Held Expectations

- Child develops knowledge of geometric principles
 - Classifies and sorts different shapes
 - Recognizes and names simple shapes in various sizes and positions
 - Combines different shapes to make representations or patterns
- Child develops spatial sense
 - Uses comparison words correctly
 - Uses words that describe the relative position of things
- Child groups similar objects together and gives reasons for groupings

Learning in Action: Examples

The Child:

- Uses a pegboard to create geometric shapes with rubber bands
- Uses spatially descriptive words (on top, under, behind, below, above, between, around)
- Compares the various sizes of unit blocks (longer, shorter, same length)
- Creates structures and designs with blocks of various shapes and sizes

The Adult:

- Encourages children to make comparisons of various object shapes and sizes
- Provides children with opportunities to create designs with pattern blocks; draw, paint and cut shapes in their artwork; weave over and under, describe 2 and 3 dimensional shapes; and locate shapes in the environment
- Provides games and activities that encourage children to move through space (action songs, obstacle courses)
- Uses language throughout the day that describes attributes of shapes and space relationships
- Takes pictures of the children's creations and records their explanation or discussion about the structure

The Environment Includes:

- A variety of materials representing various shapes and sizes for counting, comparing and drawing conclusions about relationships (boxes, tubes, containers, blocks, balls)
- Items to encourage movement (tunnel, empty box, plank)
- Labels on shelves representing the shapes of the objects that belong there

- Materials for filling and emptying, fitting things together and taking them apart
- A light table with transparent shapes for children to explore with
- Computer software that allows children to explore geometric principles

Strategies to Support Geometry and Spatial Sense

Teaching with Intent Throughout the Day:

- To increase geometric skills, show a picture of the shape and have the children describe the unique characteristics of the shape by asking, “How do we know this is a _____?”
- Play “I Spy,” asking children to find materials or objects in the room that are that same shape. Discuss what they find and make a book about the shapes in our room.
- Help children create an obstacle course. Ask the following types of questions: What is something our bodies will fit under? What is something we can go around, or climb over? After going through the obstacle course a few times, ask the children if they would like to make some changes or additions.
- Introduce both two and three-dimensional shapes, regular and irregular shapes. Engage children in drawing and tracing shapes. Encourage children to describe how shapes are the same and how they are not the same. Discuss how two sides, or top and bottom of objects (such as doll clothes, a teeter totter, toy airplane) are symmetrical and others (such as a glove, slide, and toy crane) are asymmetrical. Have children wrap boxes with paper.

Supporting Children with a Wide Range of Abilities:

- Adapt activities that provide a multisensory approach to comparing sizes and shapes that enable children to understand similarities and differences in the world around them. For example, fill and empty various containers with sand or water, discuss the shapes of container and amounts each container holds, describe and compare weights.
- Provide communication boards and pictures to enable children to make choices and tell about the world around them.

Supporting English Language Learners:

- Use vocabulary and phrases in the child’s native language when introducing new ideas/ concepts about shapes and spatial sense.
- Model language by narrating actions and labeling shapes while using self-talk strategies, “I am using this blue crayon to color in this big square.”
- Allow children to show you that they can match shapes, make geometric shapes without requiring them to use language.

Supporting Children from a Variety of Cultures:

- Emphasize shapes in the environment by showing shapes in photos of buildings from different cultures and depicting multiple cultural influences.
- Use descriptive and comparison books that include authentic photographs, illustrations that accurately reflect the cultures of the children.

Patterns and Measurement

(M.03)



Widely Held Expectations

- Child develops knowledge of patterns
 - Describes patterns in the environment and daily routine
 - Begins to recognize duplicates and extends simple patterns using a variety of materials
- Child demonstrates use of measurement
 - Uses standard and/or non-standard measures
 - Recognizes that different types of measurement can be made (height, length, weight)

Learning in Action: Examples

The Child:

- Sorts buttons, beads or pegs into egg cartons, with each compartment holding a different color, size, or shape
- Makes a pattern (by color, size, or shape) with interlocking cubes
- Collects objects from a group walk and arranges them by color, size, or shape
- Uses measuring tools at workbench or water table

The Adult:

- Engages in conversations with children about quantity and comparisons as they interact with materials throughout the day
- Uses a predictable daily routine consistently and encourages children to begin to predict what comes next in a pattern or sequence of events
- Demonstrates methods of measurement and patterning throughout the day. For example, uses a graph to document and compare the number of children choosing each vegetable as a favorite, or guessing how many footsteps it will take to walk to the fence, then charting their discoveries.

The Environment Includes:

- Materials of various sizes, colors, textures, and shapes that can be arranged in order as well as sorted and compared: blocks, beads, peg boards, matching games, measuring cups, scales, rulers, unit blocks
- Computer software that allows children to recognize and create their own series and patterns
- Posted daily schedule with pictures so children understand what happens now and next

Strategies to Support Patterns and Measurement

Teaching with Intent Throughout the Day:

- Use the rhythm sticks to create different patterns. Hit the sticks together once and the floor twice. Encourage the children to match that rhythm with their sticks. Allow individual children to take the lead.
- Have the children measure different items in the room with the length of a straw (or any other non-standard unit of measurement). The adult can choose some items and ask the children to guess how many lengths of the straw each object is. They can then measure using their own straw, and record their actual and predicted measurements on a graph.
- Arrange children in a line and tell them, “We are going to play a pattern game. See if you can figure out the pattern.” Ask the first child to stand, the second child to sit, and the third child to stand. Then ask children what the fourth child should do.
- Use visual models to help children understand and quantify differences. Make a daily routine chart where the length of each part in inches is proportional to durations in minutes. Small group time (which lasts 20 min.) is twice as big as large group time (10 min.)

Supporting Children with a Wide Range of Abilities:

- Adapt materials (attaching curlers or sponges to pencils) to support gathering of information on qualities and quantities that surrounds us every day.
- Use a multisensory approach (materials with different textures, sizes, smells, sounds) to identify patterns and relationships between objects.
- Communication boards enable children to tell about similarities and differences they encounter in their daily routines.

Supporting English Language Learners:

- Use pictures and actions to teach the language needed for making a pattern or measuring through an interpreter if possible.
- Display photographs of patterns to help children understand the concept of patterning.
- Accept minimal responses, such as the nod of the head or a smile when asking children about patterns and measurement.

Supporting Children from a Variety of Cultures:

- Use measurement and show an interest in children’s cultures by having children experience cooking foods native to their culture on a regular basis.
- Have children count and graph the number of languages spoken in their group.
- Bring in items from the community that display cultural symbols, patterns, and shape, such as clothing, quilts, and artwork.

Print Resources

- Blocks and Beyond: Strengthening Early Math and Science Skills Through Spatial Learning*, Mary Jo Pollman (2010).
- Cowboys Count, Monkeys Measure, and Princesses Problem Solve: Building Early Math Skills Through Storybooks*, Jane Wilburne (2011).
- Engaging Young Children in Mathematics: Standards for Early Childhood Mathematics Education*, Douglas H. Clements, Julie Sarama and Ann-Marie Dibiase (2003.)
- “I’m Older Than You. I’m Five” Math in the Preschool Classroom*, Ann Epstein and Suzanne Gainsley (2005).
- Math at Their Own Pace: Child-Directed Activities for Developing Early Number Sense*, Greg Nelson (2007).
- Mathematical and Scientific Development in Early Childhood*, National Research Council of the National Academies (2005).
- Mathematics in Early Childhood Education Designing Curriculum to Meet Standards with Evidence-Based Practices DVD*, Arlitt Instructional Media, University of Cincinnati (2008).
- Mathematical Thinking: Geometry, Patterning & Measurement in Early Childhood Education Designing Curriculum to Meet Standards with Evidence-Based Practices DVD*, Arlitt Instructional Media, University of Cincinnati (2010).
- Nebraska Early Learning Guidelines: Connecting Children to Nature* (2008), http://www.education.ne.gov/oec/pubs/ELG/nature_education.pdf.
- Showcasing Mathematics for the Young Child: Activities for Three-, Four-, and Five-Year-Olds*, Juanita V. Copley (2004).
- Spotlight on Young Children and Math*, Derry G. Koralek, NAEYC (2004).
- Teaching Mathematics in Early Childhood*, Sally Moomaw (2011).
- Teaching STEM in the Early Years: Activities for Integrating Science, Technology, Engineering, and Mathematics*, Sally Moomaw (2013).
- The Young Child and Mathematics* (2nd Ed.), Juanita Copley. NAEYC (2010).

These resources, and many others, may be available for Nebraska residents to borrow from the Early Childhood Training Center’s Media Center by visiting <http://www.education.ne.gov/oec/mediacr.html> or by calling 1-402-557-6885 or 1-800-89CHILD.

Online Resources

Annotated Bibliographies (click on link below for a description of topical resources available through the Early Childhood Training Center's Media Center):

Math, created on 5/2/12

Encouraging math development at home and at preschool <http://www.getreadytoread.org/early-learning-childhood-basics/early-math/understanding-numbers-and-counting-skills-in-preschoolers>

PBS Parents Play & Learn: theme-based interactive games and simple hands-on activities that connect math and literacy skills to everyday experiences; designed to build on a child's natural curiosity about his or her everyday world and to encourage dialogue between kids and parents. <http://pbskids.org/mobile/pbs-parents-play--learn.html>

National Education Goals Panel, Essential Domains of School Readiness	Revised Nebraska Early Learning Guidelines Ages 3-5 Domains & Key Elements	Teaching Strategies GOLD® Objectives, Dimensions, and Indicators	Head Start Child Development & Early Learning Framework Domains & Elements	NE K-12 Standards	NE Rule 11 Regs.	NE Child Care Licensing Standards
Cognition & General Knowledge	Mathematics: Number & Operations (M.01)	Mathematics 20a.4.	Mathematics Knowledge & Skills: Number Concepts & Quantities	MA 0.1.1b MA 0.1.1a MA 0.1.1d	004.05A4 004.05B 004.06C 004.06D 004.06E	Not Applicable
		Mathematics 20c.4.				
		Mathematics 20b.4.	Mathematics Knowledge & Skills: Number Relationships & Operations			
		Mathematics 21a.4.	Mathematics Knowledge & Skills: Geometry & Spatial Sense			
		Mathematics 22.4.	Mathematics Knowledge & Skills: Measurement & Comparison			
	Mathematics: Geometry & Spatial Sense (M.02)	Cognitive 13. 6.	Logic & Reasoning: Reasoning & Problem Solving	MA 0.2.1a MA 0.2.4a MA 0.3.1b	004.05A6 004.06C 004.06D 004.06E	
		Mathematics 21a.6.	Mathematics Knowledge & Skills: Geometry & Spatial Sense			
		Mathematics 21b.6.				
	Mathematics: Patterns & Measurement (M.03)	Mathematics 23.6.	Mathematics Knowledge & Skills: Patterns	MA 0.2.5c	004.05A3 004.05A6 004.06C 004.06D 004.06E	
		Mathematics 22.6.	Mathematics Knowledge & Skills: Measurement & Comparison	LA 0.3.1a		

Sources: Teaching Strategies, Inc.: www.TeachingStrategies.com. Revised Head Start Child Development and Early Learning Framework: [http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/teaching/eecd/Assessment/Child%20Outcomes/HS_Revised_Child_Outcomes_Framework\(rev-Sept2011\).pdf](http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/teaching/eecd/Assessment/Child%20Outcomes/HS_Revised_Child_Outcomes_Framework(rev-Sept2011).pdf). Nebraska Department of Health and Human Services Title 391- Children's Services Licensing: http://dhhs.ne.gov/publichealth/Pages/crl_childcare_childcareindex.aspx. Nebraska K-12 Academic Standards: <http://www.education.ne.gov/academicstandards/>. Nebraska Rule 11 Regulations: <http://www.education.ne.gov/legal/webrulespdf/CLEANrule112007.pdf>.