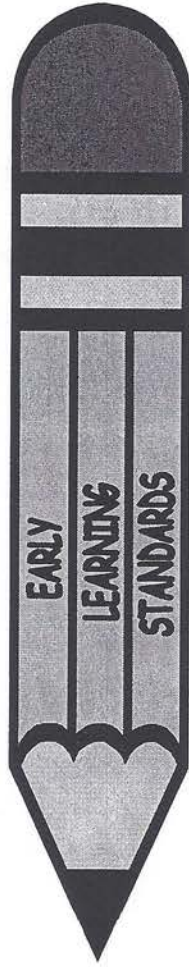


LOGICAL MATHEMATICS



for Pre-Kindergarten



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Mathematical learning in the preschool years relies on children's opportunities to describe and explore the relationships of objects and materials. Mathematics is embedded in children's active, hands-on play with real objects where children use their senses to build concept knowledge such as problem solving, comparison, time, space and number. Teachers facilitate mathematical learning when they use naturally occurring activities and events to encourage children's critical thinking skills through open-ended questioning, helping them to see the connection between living and learning.

Standard: Learn about numbers, numerical representation, and simple numerical operations

Indicator	Examples	Supportive Practices
LM 1.1 Use counting and numbers as part of play and as a means for determining quantity	The child will: <ul style="list-style-type: none"> Use fingers to represent numbers when counting 	The adult will: <ul style="list-style-type: none"> Teach children counting songs, rhymes, and chants, "1,2,3,4,5, I caught a fish alive."
LM 1.2 Count up to ten objects in meaningful context with emerging one-to-one correspondence	<ul style="list-style-type: none"> Count blocks in a structure made in the block area Match play food one for one to plates in dramatic play 	<ul style="list-style-type: none"> Provide books about numbers and counting in the library center Provide manipulatives, such as counting bears, magnetic numbers, lacing numbers
LM 1.3 Understand number concepts, vocabulary, quantities and written numerals in meaningful ways	<ul style="list-style-type: none"> Represent quantity using invented forms (e.g. marks to represent number of objects) Use concrete objects to represent quantities up to and including 5 	<ul style="list-style-type: none"> Model strategies to help children keep track of what they are counting Provide daily opportunities for the child to count and recount objects, the children present, cups needed for snack, etc.
LM 1.4 Begin to use language to compare numbers of objects with terms such as more, less, greater than, fewer, equal to	<ul style="list-style-type: none"> Use concrete objects to demonstrate one to one correspondence up to and including 5 Identify the numbers 0-5 	<ul style="list-style-type: none"> Use number words and numerals, including zero, in everyday situations
LM 1.5 Develop increased abilities to combine, separate and name "how many" concrete objects	<ul style="list-style-type: none"> Count to 20 (rote counting) Use concrete objects to build vocabulary of more and less 	<ul style="list-style-type: none"> Play number recognition games (e.g. Bingo, lotto and memory games) Provide experience with numbers through daily routines such as attendance, calendar and weather activities
LM 1.6 Use ordinal number words to describe the position of objects (first, second, third)	<ul style="list-style-type: none"> Represent equivalent forms of the same number using concrete objects and drawings up to and including 5 Group objects into equal groups 	<ul style="list-style-type: none"> Use materials and model math language to add/subtract objects (pizza onto plates, pegs into pegboard, snack choices)
LM 1.7 Begin to solve problems using numbers	<ul style="list-style-type: none"> Identify some coins (e.g. penny, nickel, dime) 	<ul style="list-style-type: none"> Ask children to pass out utensils, napkins, cups at snack time to reinforce one to one correspondence Encourage children to compare relationships between quantities, "Do we have more girls or more boys in our class?"

Standard: Understand patterns, relations and functions

Indicator	Examples	Supportive Practices
LM 2.1 Recognize how things are alike (comparisons) and identify objects that belong together (classification)	<p>The child will:</p> <ul style="list-style-type: none"> Sort manipulatives and other objects by attributes (color, shape, size, function, etc.) Identify different attributes of objects (e.g. smaller, larger size, shape) 	<p>The adult will:</p> <ul style="list-style-type: none"> Help children recognize and describe attributes Provide many types of materials for sorting and classifying (shells, cereal, pebbles, buttons etc.)
LM 2.2 Sort, categorize, classify and order objects by one attribute	<ul style="list-style-type: none"> Return materials to shelves by matching objects with labels 	<ul style="list-style-type: none"> Help children describe like & different items
LM 2.3 Sort, categorize, classify and order objects by more than one attribute	<ul style="list-style-type: none"> Notice patterns in the environment, predict what comes next, e.g. red-blue, red-blue- 	<ul style="list-style-type: none"> Provide children with opportunities to sort, categorize, classify, and order items in their environment
LM 2.4 Order objects by properties (e.g. from small to large, lightest to darkest)	<ul style="list-style-type: none"> Anticipate the pattern in a repetitive book, poem or song (e.g. "Brown Bear, Brown Bear") 	<ul style="list-style-type: none"> Draw children's attention to various patterns in the environment, "I see a pattern on your shirt - blue stripe, red stripe."
LM 2.5 Explain why and how objects are organized	<ul style="list-style-type: none"> Reproduce patterns using concrete objects 	<ul style="list-style-type: none"> Describe the patterns children have created in their artwork and play, "I see you made a pattern with the blocks: long block, short block, long block, short block."
LM 2.6 Recognize, describe and extend patterns	<ul style="list-style-type: none"> Recognize same and different in a group of familiar objects Collect objects on walks then sort by attribute Clap out rhythmic patterns, such as clap-clap-snap, clap-clap-snap Create musical patterns Create patterns with manipulatives such as blocks Create patterns with art materials 	<ul style="list-style-type: none"> Demonstrate simple patterns using children, objects, and flannel boards Have children recreate patterns using lacing beads, geoboards, and other manipulatives Provide opportunities for children to create their own patterns for others to follow and extend Help the child recognize and describe sequences in nature, daily routines and in stories

Standard: Develop concepts of space and shape

Indicator	Examples	Supportive Practices
LM 3.1 Recognize, name, describe, build, draw, and compare two and three dimensional shapes	The child will: <ul style="list-style-type: none"> Recognize two-dimensional shapes (circle, square, triangle and rectangle) 	The adult will: <ul style="list-style-type: none"> Talk about geometric shapes in the environment and in children's play
LM 3.2 Put together and take apart increasingly more difficult shapes	<ul style="list-style-type: none"> Build with geometric shaped concrete objects in play Make shapes using concrete objects 	<ul style="list-style-type: none"> Take children on a shape walk looking for geometric shapes in the environment
LM 3.3 Determine whether or not two shapes are the same size and shape	<ul style="list-style-type: none"> Recognize common geometric shapes in real life 	<ul style="list-style-type: none"> Describe spatial relationships you observe as children play, "You're putting the baby in the cradle."
LM 3.4 Recognize geometric shapes in books, artwork, and the environment	<ul style="list-style-type: none"> Follow directions that use positional words (e.g. In, on, under, over, next to, between, beside, above, below, front, back) 	<ul style="list-style-type: none"> Use shapes for classroom materials (name tags, job charts, calendars) Provide books about geometric shapes
LM 3.5 Understand directionality, order, and positions of objects, using words such as up, down, over, under, top, bottom, inside, outside, in front of, behind	<ul style="list-style-type: none"> Use positional words in play (e.g. "My truck is under the table.") Create symmetrical figures using Lego's, pattern blocks, etc. Use geoboards to create shapes with rubber bands 	<ul style="list-style-type: none"> Provide shape templates, puzzles, attribute blocks, parquetry and pattern blocks in centers Provide experiences in making shapes with play dough, geoboards, popsicle sticks, pattern blocks
LM 3.6 Show an awareness of symmetry		<ul style="list-style-type: none"> Use music and movement experiences to explore different positions in space Provide empty boxes, tubes, and containers for children to use in creating and constructing

Standard: Develop and use measurement concepts

Indicator	Examples	Supportive Practices
<p>LM 4.1 Demonstrate awareness of measurement attributes (length, volume, weight, area, time and temperature)</p>	<p>The child will:</p> <ul style="list-style-type: none"> • Select non-standard items to measure objects (e.g. hands, shoe lengths, yarn, and blocks) • Identify clocks for telling time, thermometers for telling the temperature • Use standard measuring items to explore measurement (ruler, yardstick, measuring tape, height charts) • Describe the daily routine • Anticipate what happens next in the daily schedule • Relate sequence of events from classroom or home experiences • Use measuring cups and spoons during cooking activities • Label times of day as morning and night time 	<p>The adult will:</p> <ul style="list-style-type: none"> • Show children how to measure with nonstandard items, "The shelf is 6 blocks long." • Use open-ended questions, "I wonder how many cups of sand this bowl will hold?" • Provide measuring tools such as clocks, rulers, scales, thermometers, timers, and measuring cups for children to explore and use in their play • Provide weighing and balancing activities using scales • Provide experiences with play money, price tags, cash registers and clocks in dramatic play areas • Provide cooking experiences • Provide recipes, recipe books and measuring cups and spoons in the kitchen area • Use a weekly calendar, indicating special days, birthdays and use terms such as yesterday, today or tomorrow
<p>LM 4.2 Develop an awareness of seriation. Compare attributes such as length (shorter – taller), size (bigger – smaller), weight (heavier – lighter), in everyday situations</p>		
<p>LM 4.3 Use standard and non-standard measures in everyday situations</p>		

Standard: Represent and interpret data

Indicator	Examples	Supportive Practices
LM 5.1 Gather information about themselves and their surroundings	The child will: <ul style="list-style-type: none"> • Make tally marks under “yes” and “no” on a clipboard while doing a survey of what the group prefers for snack – juice or milk 	The adult will: <ul style="list-style-type: none"> • Pose a question of the day and graph the answers
LM 5.2 Contribute data for simple graphs	<ul style="list-style-type: none"> • Draw a picture of each object that floats and each object that sinks after testing them at the water table 	<ul style="list-style-type: none"> • Create graphs of the collections founds in the classroom
LM 5.3 Organize and display data on graphs using objects and picture	<ul style="list-style-type: none"> • Organize and display objects on a graph, i.e. number of people who have sisters, kinds of vehicles in the parking lot) 	<ul style="list-style-type: none"> • Provide graphing experiences such as recording the weather
LM 5.4 “Read” and interpret displays of data using words to compare (e.g. quantity, size, speed, and weight)	<ul style="list-style-type: none"> • Discuss data from everyday events and predict what will happen next (i.e. changes in weather) • Make predictions based on questions posed by adults • Look at the organization of data on a graph they helped to create and discuss what they observe (There were more cars than trucks. Jamie has the biggest family.) • Participate in discussion using information from child created graphs and charts 	<ul style="list-style-type: none"> • Use graphing as an extension of themes in science and literature • Ask children to explain their thinking • Provide experiences with different types of graphs (real objects, pictographs, photographs, vertical and horizontal bar graphs)

Standard: Reason, predict and problem solve

Indicator	Examples	Supportive Practices
LM 6.1 Make predictions based on observations and information	The child will:	The adult will:
LM 6.2 Use simple strategies to problem solve	<ul style="list-style-type: none"> Ask questions to clarify problems ("Will the new cage be big enough for the hamster?") Solve problems by guessing and checking, using concrete objects (figures out how many napkins are needed for snack) 	<ul style="list-style-type: none"> Use open-ended questions to encourage problem solving Describe problem-solving strategies employed by the children
LM 6.3 Tell others how to solve a problem	<ul style="list-style-type: none"> Estimates whether there are enough blocks to build a road 	<ul style="list-style-type: none"> Draw attention to problem solving situations within the classroom environment
LM 6.4 Understand that there is more than one way to solve a problem	<ul style="list-style-type: none"> Makes observation and asks "why?" 	<ul style="list-style-type: none"> Provide planned opportunities for children to predict in naturally occurring activities
LM 6.5 Develop the ability to compare/contrast solution strategies	<ul style="list-style-type: none"> Solves problems through trial and error Finds more than one solution to a problem, task or question 	
LM 6.6 Use the language of mathematics to express mathematical ideas		