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ABSTRACT

This document is comprised of three publications of the early childhood section of the Missouri Department of Elementary and Secondary Education: (1) prekindergarten mathematics standards; (2) a teacher's guide for early mathematics; and (3) a parent's handbook for early mathematics. The standards, developed by a broad-based group of individuals whose backgrounds represent the many facets of the Missouri early childhood community, provide broad descriptions of what most children should know and be able to do by the time they enter kindergarten and represent a shared set of expectations for preschoolers in the field of mathematics. The standards publication delineates the Missouri prekindergarten guiding principles and presents process standards, indicators of competency development, and examples of behaviors children may exhibit in their mathematical development in the following areas: (1) number and operations; (2) geometry and spatial sense; (3) patterns and relationship; (4) measurement; and (5) exploring data. The teacher's guide explains the standards and offers practical suggestions for creating engaging, developmentally appropriate learning communities that foster each child's mathematical thinking. The guide includes definitions of the mathematical concepts used in the standards, suggested teaching strategies for each standard area, suggestions for involving parents and families, and a 62-item resource list of books, websites, magazines, and other materials. The parent handbook introduces the mathematics standards, defines mathematical terms, provides information on how a child may exhibit

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progress toward a particular standard or goal, and offers suggestions for parental support of mathematical development. The handbook closes with a list of general tips for parents, an 11-item bibliography, and a list of 63 books for young children incorporating mathematical concepts. (KB)

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Missouri Pre-K Mathematics Standards, Teacher's Guide, [and] Parent Handbook: Early Mathematics.

Missouri Department of Elementary and Secondary Education
Early Childhood Section

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Missouri Pre-K Mathematics Standards

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Introduction

The standards are broad descriptions of what most children should know and be able to do by the time they enter kindergarten. They are not a curriculum but are a framework for communicating a shared set of expectations for preschool children in the field of mathematics.

We realize some children will far exceed these standards; others will not enter kindergarten with the knowledge and experiences suggested in this document. Just as we recognize that different people bring different things to our society, we also recognize that variability in children is normal. The standards are not intended to be used to determine whether a child "is ready" to enter kindergarten. The standards are, however, goals for adults to use in supporting the mathematical development of preschool children. Available evidence indicates that the standards are appropriate for most children.

The standards were developed by a broad-based group of individuals whose backgrounds are representative of many facets of the early childhood community in Missouri. The standards are intended to be used in a variety of early childhood settings by a variety of people — parents, parent educators, child-care providers, Head Start and public/private school teachers, etc. They are consistent with current research and recommendations from other state and national initiatives.

It is our hope that the ultimate beneficiaries of this work will be our children, resulting in all children entering school ready to succeed.

Missouri Pre-K Guiding Principles

1. All children actively seek to comprehend the world in which they live. Given the opportunity to make choices concerning their activities, they acquire knowledge, skills and the ability to solve problems.

2. Children construct knowledge and values through interactions with peers, parents and other adults and through active exploration of the physical and social environment.

3. Young children's thinking contains predictable errors.

4. Early learning and areas of development interact and influence each other.

5. Families (parents) are the child's first and most important teachers.

6. Children exhibit individual differences in their development of competencies.

Missouri Pre-K Standards for Mathematics

Content Component	Process Standards
Number and operations	Uses number to show quantity Uses language to represent number of objects Solves problems using number Uses numerical representation
Geometry and spatial sense	Investigates positions and locations Explores shapes in the environment
Patterns and relationships	Recognizes relationships in the environment Uses patterns in the environment
Measurement	Makes comparisons Uses measurement
Exploring data	Collects, organizes and uses information

Process Standards ..... Competencies in the process of mathematical development.

Indicators ..... Milestones toward the development of competencies.

Examples ..... Observable behaviors children may exhibit in their mathematical development.

Guiding Principles ..... Principles of child development that guide Missouri early childhood practices.

Number and operations

Uses number to show quantity.

Number and operations: understanding of numbers, ways of representing numbers, relationships among numbers and number systems

Number: a unit belonging to a mathematical system used for counting, measuring, ordering and labeling; the meaning of a number word or numeral

Number sense: the ability to understand numbers, ways of representing numbers and relationships among numbers (Number sense is much more than counting — it involves the ability to think and work with numbers easily and to understand their uses (i.e., counting, measuring, ordering and labeling) and relationships.)

Numerals: conventional symbols that represent numbers (e.g., "1" is the numeral for "one")

Rote count: recite the names of the numerals in order or sequence (e.g., singing a counting song)

Count with understanding: attach a number name to a series of objects; to understand that the number spoken when tagging or touching the last object also identifies the total number in the group

Ordinal numbers: numbers that indicate the position of an object in a sequence (i.e., first, second, third)

Operations on numbers: basic number combinations and strategies for computing such as addition and subtraction

Quantity: how many units are in a set (i.e., an amount or the result of counting)

Everyday fractions: numbers that represent parts of whole objects in the child's environment (e.g., half a sandwich)

One-to-one correspondence: linking a single number name with one object, and only one, at a time

Estimate: make an educated guess as to the amount or size of something

Indicator	Examples
1. Shows interest in counting and quantity.	The child • uses fingers to indicate the number (e.g., holds up five fingers to show age). • repeats counting rhymes and singing games with numbers. • counts familiar objects (e.g., family members, friends, toys) although not always accurately. • asks how many.
2. Develops increasing ability to rote count in sequence.	The child • counts from one to 10 or beyond.
3. Counts objects with understanding.	The child • counts five items (e.g., blocks, crayons, cars) accurately. • hands one to five objects upon request (e.g., hands you three potatoes when you say, "Joe, hand me three potatoes.")

Number and operations

Uses language to represent number of objects.

Indicator	Examples
1. Uses language to compare number (e.g., more/less, greater/fewer, equal to).	The child • looks at his or her own and another child's blocks and determines who has more blocks. • compares raisins with a friend's and decides they have the same amount. • asks, "How many more do you have?"
2. Combines and names how many.	The child • puts the red, yellow and blue crayons together and counts how many crayons there are. • recognizes that three cars and two trucks is a total of five vehicles.
3. Separates and names how many.	The child • participates in finger plays, songs or stories such as "Five Little Monkeys" or "Five Little Ducks" that use backward counting. • plays with a plastic ball and bowling pins and can tell how many fell down and how many are left standing.
4. Explores everyday fractions.	The child • says (although not always accurately), "I have a whole orange," or "I have half an apple."

Number and operations

Solves problems using number.

Indicator	Examples
1. Names how many there are in a group (up to five objects) without counting.	The child • recognizes that there are two or three crayons in a box. • rolls a number cube and tells how many dots are on it without counting.
2. Uses one-to-one correspondence when counting objects.	The child • can count five blocks in a row, saying the number as each block is touched. • gets a carton of milk for each child at the table. • puts a cup with each napkin when setting the table. • holds an additional finger up for each number when counting orally.
3. Uses one-to-one correspondence to compare the size of a group of objects.	The child • compares two rows of blocks, two in one line and four in another, and can tell which one has more or less. • matches number of cars to a friend's and says, "I have more."
4. Estimates, then counts to verify the number of objects.	The child • while playing in the sand guesses how many cups it would take to fill a bucket and counts the cups of sand put in the bucket. • guesses how many pennies are on the table, then counts the pennies.

Number and operations

Uses numerical representation.

Indicator	Examples
1. Uses drawings to represent number.	The child • draws pictures showing size (e.g., short/tall) and quantity of family members. • creates a way to keep score during a game. • draws a picture to indicate number of objects or snacks.
2. Identifies numerals in everyday situations.	The child • selects numerals on the telephone, calculator or computer. • finds and names numerals in books or on signs.
3. Uses ordinal numbers (first, second, last).	The child • can identify position in a line of children (e.g., who is first, second, last). • can put three objects in a line and tell which object is first, middle or last. • tells the position of objects (i.e., first, second, last).
4. Writes some numerals.	The child • draws numerals in sand. • creates numerals with rolled clay or pipe cleaners. • tries to write how old he or she is. • tries to copy a telephone number.
5. Matches numeral with quantity.	The child • when playing a game with a spinner or number cube, correctly counts the spaces on the game board that match the numeral or symbol. • uses magnetic or flannel numerals to show how many marbles there are.

Geometry and Spatial Sense

Investigates positions and locations.

Geometry: the area of mathematics that involves shape, size, position, direction and movement and describes and classifies the physical world we live in

Location: where an object is in space

Orientation: the position or arrangement of an object

Position: the place where an object or person is in relation to others

Attribute: a characteristic or feature of an object such as color, size, shape, weight and number of sides

Spatial sense: children's awareness of themselves in relation to the people and objects around them; includes knowing boundaries, arrangements and positions

Shape: the form of an object

- Three-dimensional: objects that have length, width and depth; solid figures such as cubes, spheres and cylinders
- Two-dimensional: objects that have length and width but not depth; shapes such as squares, triangles and circles

Indicator	Examples
1. Takes objects apart and puts them together.	The child • builds with interlocking blocks. • puts lids on containers. • completes simple puzzles.
2. Uses actions and words to indicate position and location.	The child • moves self to show positions during play (e.g., under a table, in the tent, between friends). • uses objects to show position (e.g., puts the bears on/off/on top of/ above/below/beside the box). • talks about objects that are on/off/under/in front of/behind/inside/ outside/next to/between/etc. • says when reading *The Three Billy Goats Gruff*: "The big billy goat is on the bridge, and the troll is under the bridge."
3. Uses actions and words to indicate movement and orientation.	The child • moves self to show positions (e.g., up, down, forward, backward, around, through, to, from, sideways, across, back and forth, in a straight or curved path). • explains where objects in a room have been moved. • describes how to get to a location using landmarks. • follows a path or moves through an obstacle course. • draws paths or beginnings of a map to show location during play.

Geometry and Spatial Sense

Explores shapes in the environment.

Indicator	Examples
1. Investigates and talks about the characteristics of shapes.	The child • says, "A circle is round." • discovers some blocks stack and some blocks roll. • says that squares and triangles have corners and straight sides.
2. Creates and duplicates three-dimensional and two-dimensional shapes using a variety of materials.	The child • uses blocks to make other shapes or objects. • makes shapes with Play-Doh, pipe cleaners, string or yarn. • attempts to draw shapes and make pictures using shapes. • says after cutting the sandwich, "Look, I made a triangle (or rectangle) with my sandwich."
3. Identifies and names some shapes.	The child • points to or names simple shapes (e.g., box shape, ball shape, circle, triangle, square). • says, "The pizza is round. My piece is triangle-shaped." • says, "The flag is the shape of a rectangle."
4. Indicates if shapes are alike or different using one or more characteristics.	The child Three-dimensional shapes • says, "A bubble and an orange are both like balls (spheres)." • says, "A block (cube) is shaped like a box." • says, "This ball rolls, but this block does not." Two-dimensional shapes • says, "A triangle has three sides," or "A square has four sides." • says, "A circle is curved (round) like a hula hoop."

Patterns and Relationships (algebra)

Recognizes relationships in the environment.

Patterns and relationships (algebra): the primary objective is for young children to be able to identify and analyze simple patterns, extend them and make predictions about them

Match: find two objects that have at least one characteristic in common

Sort: place or assign objects in two or more groups on a basis of at least one characteristic

Regroup: place or assign objects in two or more groups using a different characteristic than was used the first time the objects were grouped

Order: arrange objects or numbers to show a progressive increase or decrease of a specific characteristic

Relative difference: the specific characteristic that differs among a group of objects (e.g., size)

Pattern: a sequence of colors, shapes, objects, sounds or movements that repeats again and again in a regular arrangement; patterns are a way for young students to recognize order and to organize their world

Extend: continue a pattern beyond what is shown

Indicator	Examples
1. Matches, sorts and regroups objects according to one or more characteristic.	The child • sorts plastic foods by size, color, shape or category. • matches objects that are alike (e.g., puts all of the two-hole buttons in one pile and four-hole buttons in another). • matches adult animals to their babies. • when playing Go Fish, matches all the cards with threes.
2. Orders things according to relative differences.	The child • sorts stuffed animals from smallest to largest. • talks about who is tall, taller, tallest. • arranges a group of blocks from longest to shortest.

Patterns and Relationships (algebra)

Uses patterns in the environment.

Indicator	Examples
1. Recognizes patterns.	The child • talks about color or pattern in clothing (e.g., says, "I have red and blue stripes on my shirt."). • identifies color patterns that repeat (e.g., red, blue, red, blue).
2. Duplicates and extends patterns.	The child • imitates a pattern of sounds and physical movements (e.g., clap, stomp, clap, stomp, ...). • continues rhythmic patterns. • completes the patterns in a story (e.g., says, "Brown Bear, Brown Bear, what do you see?"). • repeats a pattern according to size, color, shape, etc. while stringing beads. • predicts what comes next when an adult "reads" the pattern using simple vocabulary (e.g., car, car, boat, car, car, ____).
3. Creates patterns.	The child • creates simple patterns with beads or blocks according to color, size or shape. • creates simple patterns when drawing, coloring or painting.

Measurement

Makes comparisons.

Measurement: young children's intuitive notions of comparing volume, area, length and other attributes that they will eventually learn to measure; involves decisions about how much or how long

Compare: think about same and different; describe the relationship between two or more objects

Measurable features: characteristic or attribute of an object that can be quantified (represented with a number) such as size, shape, weight and number of sides

Sequence: an arrangement of events or actions in a progressive order over time

Indicator	Examples
1. Compares objects using measurable features.	The child • uses words to describe opposites (e.g., big/little, long/short, heavy/light). • chooses the largest snack. • says, "My bucket is heavier." • says, "This crayon is shorter."
2. Describes measurement.	The child • talks about an object being longer than another object. • uses a variety of language to describe measurement (e.g., shorter, taller, wider, bigger, heavier, lighter, holds more, hot, cold).
3. Orders three or more objects according to length or size differences.	The child • places ribbons in order by length. • puts cars in a row according to size. • puts pans (or measuring cups) inside each other.
4. Uses language associated with time in everyday situations.	The child • says, "Snack time comes after rest time." • says, "It's nighttime because it is dark." • says, "I eat breakfast in the morning." • says, "My birthday comes in the summer."
5. Anticipates, remembers and predicts a sequence of events.	The child • says, "I brush my teeth before I go to bed." • says, "We went to the library and then the grocery store." • recalls recent events and talks about them (e.g., says, "Yesterday we went to the zoo."). • describes the sequence of activities when going to the grocery store. • tells stories such as "The Three Little Pigs" with events in order. • points out when a familiar story is not told in the correct order.

Measurement

Uses measurement.

Indicator	Examples
1. Explores ways to measure.	The child • fills a container with solids or liquid (e.g., sand, ice cubes, water). • pours liquid from one container to another container. • sees how many blocks it takes to cover a sheet of paper.
2. Measures using objects.	The child • places a string next to an object to measure length. • uses the toy thermometer to measure the "patient's" temperature. • imitates using a ruler when helping dad.

Exploring data

Collects, organizes and uses information.

Exploring data: informal experience with data by collecting, organizing, representing and comparing the information

Data: information gathered to answer a question

Classify: sort or form groups by similar characteristics

Organize: arrange information in order to see relationships, often using graphs and charts

Indicator	Examples
1. Asks questions to gather information.	The child • asks, "What is your favorite color?" • asks, "What month is your birthday?" • asks, "What do you like to play outside?" • asks, "How many brothers and sisters do you have?"
2. Sorts and classifies objects into groups and sometimes explains how the grouping was done.	The child • puts objects together that have the same use (e.g., blocks, dishes, vehicles, clothes). • explains how the buttons were sorted (e.g., says, "I put the red buttons together.").
3. Evaluates information to answer questions.	The child • says two kids have birthdays in July. • says, "I have five trucks and four cars." • says, "More buttons are red."

Mathematics Development Committee

Margaret Albrecht, Parents as Teachers National Center
Diane Bauer, OACAC Head Start
Dee Beck, DESE
Karen Berding, Moberly School District
Gretchen Berhorst, DESE
Linda Biederman, Rockwood School District
Lana Brooks, DESE
Ruth Carmichael, Springfield School District
Julie Cowell, DESE
Ruby Crenshaw-Harriman, Daruby Early Learning Center
Jeannie Edwards, St. Louis Community College at Florissant Valley
Ruth Flynn, DESE
Terrie Foltz, Project Construct National Center
Sheri Griffin, Central Methodist College
Angie Koetting, DESE
Jane Kostelc, Parents as Teachers National Center
Val Lane, Children's Therapy Center
Peg Lee, Francis Howell School District
Amy Lightle, New Bloomfield School District
Bianca Love, Kansas City School District
Freda Markley, Consultant
Maurita McCarthy, Project Construct National Center
Twanna McDaniel, Asia's Learn and Play House
Becky Myers, Project Reach
Darin Preis, Head Start Collaboration Office
Kellie Quinn, LIFT
JoAnne Ralston, Department of Health and Senior Services
Tammy Randolph, Southeast Missouri State University
Cindy Reese, Division of Family Services
Sharon Schneeberger, Project Construct National Center
Cindy Segalhorst, Francis Howell School District
Jodi Trautwein, Southeast Missouri State University
Theresa Villmer, DESE
Susan Whiting, DESE
Lisa Willoughby, Cole Camp School District
Kathi Winkler, Hickman Mills School District
Maureen Zupanec, Lee's Summit School District

Mathematical Concepts Defined for Early Childhood

Definitions for mathematical concepts found in each of the Missouri Preschool Mathematical Content Components can be found on the page where the first process standard of each content component is described. The definitions were gleaned from the following resources.

Copley, J.V. (2000). *The young child and mathematics.* Washington, DC: National Association for the Education of Young Children.

Fromboluti, C.S., and Rinck, N. (1999). *Early childhood: Where learning begins: mathematics.* Jessup, MD: U.S. Department of Education.

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Waite-Stupiansky, S., Church, E.B., Feeney, L., Karnes, M., Katz, L.G., and Ward, C. (1992). *Learning through play: Math, a practical guide for teaching young children.* New York: Scholastic.

Wolf, D.P., and Neugebauer, B. (Eds.). (1996). *More than numbers: Mathematical thinking in the early years.* Redmond, WA: Child Care Information Exchange.

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Missouri Department of Elementary and Secondary Education
Early Childhood Section
P.O. Box 480
Jefferson City, MO 65101
(573) 751-2095
dese.mo.gov

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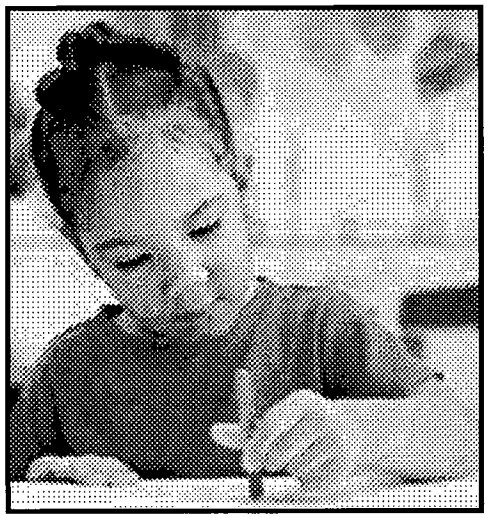

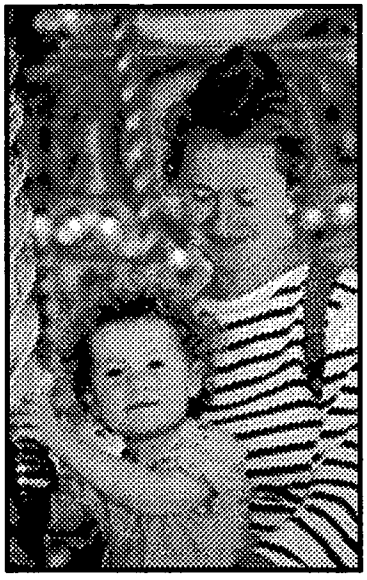

Teacher's Guide:

Early Mathematics

Missouri Department of Elementary and Secondary Education ■ Early Childhood Section

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Purpose

This guide, along with the *Parent Handbook*, is a companion to the *Missouri Pre-K Mathematics Standards*. It is intended for all adults who work with preschool-age children and their families — teachers, caregivers and/or parent educators. It explains the standards and contains practical suggestions for creating engaging, developmentally appropriate learning communities to foster each child's mathematical thinking.

Why is it important to have mathematics standards for pre-kindergarten learners? In Missouri, the Outstanding Schools Act of 1993 called together a group of master teachers, parents and policy-makers from around the state. The result of that group's work are the Show-Me Standards, which are designed for students in kindergarten through grade 12 and serve to ensure that graduates of Missouri's public schools have the knowledge, skills and competencies to lead productive, fulfilling and successful lives. However, we all realize the foundations for learning are laid well before a child enters kindergarten! Research tells us the pre-kindergarten years provide crucial opportunities for educators and caregivers to influence children's growth and development. If our goal is that every child enter kindergarten ready to learn and succeed, pre-kindergarten educational standards can provide us with shared understandings about the competencies critical for this to occur. In addition, pre-kindergarten standards provide a direct link to the Show-Me Standards, so we know that we are preparing children for the high expectations they will encounter as they progress through school.

To this end, the *Missouri Pre-K Mathematics Standards* describe what most children should know and be able to do in the area of mathematics by the time they enter kindergarten. They represent a shared set of expectations for preschool children, expectations developed by drawing upon current research about how young children learn. It is important to keep in mind, however, that children learn and develop in their own unique ways. While research demonstrates that these standards are appropriate for most children who are about to enter kindergarten, our responsibility as educators is to assess where each child is on the continuum of mathematical thinking and build on what that child knows and can do.

Ongoing observational assessment is a key element in supporting children's early mathematical development. This guide will illustrate some indicators that teachers can reliably assess to show each child's progress over time. This data can be used to plan meaningful, engaging learning experiences that promote both mathematical development and a love for solving problems. In addition, you will find information about creating mathematically rich environments and partnering with parents and families to promote mathematical thinking and an enthusiasm for learning. Lists defining the mathematical terms referred to in the standards and outlining helpful resources are also included.

Guiding Principles

Missouri early childhood practices are based on the following principles. They provide a structure to support our work with young children and remind us of the "big picture" — the theoretical framework for our teaching.

1. **All children actively seek to comprehend the world in which they live.** Given the opportunity to make choices concerning their activities, they acquire knowledge, skills and the ability to solve problems. Children are born with a desire to learn about and make sense of their world. Research has shown us that if children are able to choose what they would like to find out about, they not only gain knowledge and skills but are highly motivated to do so. We can foster this early love for learning by allowing children choices in their activities and by supporting their attempts to solve their own problems.
2. **Children construct knowledge and values through interactions with peers, parents and other adults and through active exploration of the physical and social environments.** Children flourish in a learning community where they can directly act on objects and interact with people. This is because, for young children, thoughts and actions are very closely related. When we provide children with opportunities to explore, experiment, make predictions, collaborate and share their thinking with others, we support both their cognitive and social development.
3. **Young children's thinking contains predictable errors.** As children develop, they construct knowledge by integrating new information with what they already know. In doing so, children will often make errors or mistaken assumptions. This is a necessary part of the learning process. When we give children enough time and appropriate guidance to recognize and correct their errors, we not only teach them how to think for themselves, but we show them that we have confidence that they can figure things out. Children with confidence in their own ability to work through problems are active thinkers!
4. **Early learning and areas of development interact and influence each other.** While adults are accustomed to categorizing learning by subject areas (science, math, etc.), this is not how young children organize their thoughts. Their emotional and social development goes hand in hand with their learning in other areas. In fact, a child's ability to build a knowledge base depends upon his or her social, emotional and physical development and is closely linked to it. As educators, we serve children best by designing learning experiences that are both meaningful to them and that span various areas of development.

5. **Families (parents) are the child's first and most important teachers.** Families (parents), as children's earliest and most influential teachers, are our most helpful partners in educating young children. We are all deeply invested in the child's success and share a common goal: to provide the best education possible in a safe, nurturing environment that is rich with opportunities for learning. Building open, respectful and trusting relationships with the parents and families of the children in our care helps children develop a sense of security and continuity between home and school.
6. **Children exhibit individual differences in their development of competencies.** Although research (and our own experience) has shown us that children generally go through identifiable stages as they grow and develop, it is also true that there can be great individual differences in the rate and manner in which children pass through these stages. This variation is normal. We can best support each child's progress by meeting children where they are and building on their strengths.

children flourish in a learning community where they can directly act on objects and interact with people

Organization

The standards cover the broad scope of child development and are organized by:

I. **Content Component** — the specific content area to be addressed (e.g., number and operations or measurement).

II. **Process Standards** — identifiable competencies or capabilities in the process of mathematical development, such as solving problems using number or using numerical representation.

III. **Indicators** — observable milestones in the development of competencies, such as writing some numerals or taking objects apart and putting them together again.

IV. **Examples** — specific behaviors children may exhibit in their mathematical development.

This structure provides us with an accessible way to see how the standards fit into our curriculum and teaching practices. Definitions of the terms and concepts used in the standards are listed on pages 6 through 8.

Mathematics Standards (Goals) for the Preschool Years

Below are the Standards (Goals) for Pre-K Mathematics as identified by the Missouri Department of Elementary and Secondary Education, Early Childhood Section.

Number and operations

- Uses number to show quantity.
- Uses language to represent number of objects.
- Solves problems using number.
- Uses numerical representation.

Geometry and spatial sense

- Investigates positions and locations.
- Explores shapes in the environment.

Patterns and relationships

- Recognizes relationships in the environment.
- Uses patterns in the environment.

Measurement

- Makes comparisons.
- Uses measurement.

Exploring data

- Collects, organizes and uses information.

Mathematical Concepts Defined

Content component: Number and operations

Number and operations: understanding of numbers, ways of representing numbers, relationships among numbers and number systems
Number: a unit belonging to a mathematical system used for counting, measuring, ordering and labeling; the meaning of a number word or numeral
Number sense: the ability to understand numbers, ways of representing numbers and relationships among numbers (Number sense is much more than counting; it involves the ability to think and work with numbers easily and to understand their uses (counting, measuring, ordering and labeling) and relationships.)
Numerals: conventional symbols that represent numbers (e.g., "1" is the numeral for "one")

Rote count: recite the names of the numerals in order or sequence (e.g., singing a counting song)
Count with understanding: attach a number name to a series of objects; to understand that the number spoken when tagging or touching the last object also identifies the total number in the group
Ordinal numbers: numbers that indicate the position of an object in a sequence (i.e., first, second, third)
Operations on numbers: basic number combinations and strategies for computing such as addition and subtraction
Quantity: how many units are in a set (i.e., an amount or the result of counting)
Everyday fractions: numbers that represent parts of whole objects in the child's environment (e.g., half a sandwich)
One-to-one correspondence: linking a single number name with one object, and only one, at a time
Estimate: making an educated guess as to the amount or size of something

Content component: Geometry and spatial sense

Geometry: the area of mathematics that involves shape, size, position, direction and movement and describes and classifies the physical world we live in
Location: where an object is in space
Orientation: the position or arrangement of an object
Position: the place where an object or person is in relation to others
Attribute: a characteristic or feature of an object such as color, size, shape, weight and number of sides
Spatial sense: children's awareness of themselves in relation to the people and objects around them; it includes knowing boundaries, arrangements and positions
Shape: the form of an object

- **Three-dimensional:** objects that have length, width and depth; solid figures such as cubes, spheres and cylinders
- **Two-dimensional:** objects that have length and width but not depth; shapes such as squares, triangles and circles

Content component: Patterns and relationships

Patterns and relationships (algebra): the primary objective is for young children to be able to identify and analyze simple patterns, extend them and make predictions about them
Match: to find two objects that have at least one characteristic in common
Sort: to place or assign objects in two or more groups on a basis of at least one characteristic
Regroup: to place or assign objects in two or more groups using a different characteristic than was used the first time the objects were grouped

Order: arrange objects or numbers to show a progressive increase or decrease of a specific characteristic
Relative difference: the specific characteristic that differs among a group of objects (e.g., size)
Pattern: a sequence of colors, shapes, objects, sounds or movements that repeats again and again in a regular arrangement; patterns are a way for young students to recognize order and to organize their world
Extend: continue a pattern beyond what is shown

Content component: Measurement

Measurement: young children's intuitive notions of comparing volume, area, length and other attributes that they will eventually learn to measure; involves decisions about how much or how long
Compare: think about same and different; describe the relationship between two or more objects
Measurable features: a characteristic or attribute of an object that can be quantified (represented with a number) such as size, shape, weight and number of sides
Sequence: an arrangement of events or actions in a progressive order over time

Content component: Exploring data

Exploring data: informal experience with data by collecting, organizing, representing and comparing the information
Data: information gathered to answer a question
Classify: sort or form groups by similar characteristics
Organize: to arrange information in order to see relationships, often using graphs and charts

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Acknowledgments

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Committee Members

Margaret Albrecht, Parents as Teachers National Center

Diane Bauer, OACAC Head Start

Dee Beck, DESE

Karen Berding, Moberly School District

Gretchen Berhorst, DESE

Linda Biederman, Rockwood School District

Lana Brooks, DESE

Ruth Carmichael, Springfield School District

Julie Cowell, DESE

Ruby Crenshaw–Harriman, Daruby Early Learning Center

Jeannie Edwards, St. Louis Community College at Florissant Valley

Ruth Flynn, DESE

Terrie Foltz, Project Construct National Center

Sheri Griffin, Central Methodist College

Angie Koetting, DESE

Jane Kostelc, Parents as Teachers National Center

Val Lane, Children's Therapy Center

Peg Lee, Francis Howell School District

Amy Lightle, New Bloomfield School District

Bianca Love, Kansas City School District

Freda Markley, Consultant

Maurita McCarthy, Project Construct National Center

Twanna McDaniel, Asia's Learn and Play House

Becky Myers, Project Reach

Darin Preis, Head Start Collaboration Office

Kellie Quinn, LIFT

JoAnne Ralston, Department of Health and Senior Services

Tammy Randolph, Southeast Missouri State University

Cindy Reese, Division of Family Services

Sharon Schneeberger, Project Construct National Center

Cindy Segalhorst, Francis Howell School District

Jodi Trautwein, Southeast Missouri State University

Theresa Villmer, DESE

Susan Whiting, DESE

Lisa Willoughby, Cole Camp School District

Kathi Winkler, Hickman Mills School District

Maureen Zupanec, Lee's Summit School District

ERIC

Number and operations

Uses number to show quantity.

This standard refers to the child's increasing understanding that numbers represent quantities. It is an important component of number sense — the ability to understand how numbers are used and how they are represented as well as relationships among numbers.

There are three indicators for this standard:

Indicators The child ...	Examples The child ...
Shows interest in counting and quantity.	• uses fingers to indicate the number (e.g., holds up five fingers to show age). • repeats counting rhymes and singing games with numbers. • counts familiar objects (e.g., family members, friends, toys) although not always accurately. • asks how many.
Develops an increasing ability to rote count in sequence.	• counts one to 10 or beyond.
Counts objects with understanding.	• counts five items (e.g., blocks, crayons, cars) accurately. • hands one to five objects upon request (e.g., hands you three potatoes when you say, "Joe, hand me three potatoes.")

Teacher strategies to promote use of number to show quantity include:

- encouraging children to experiment with counting in ways that are meaningful to them.
- engaging children in singing counting songs.
- reading big books that feature counting or numbers (e.g., *Ten Black Dots*).
- modeling counting of objects or people in meaningful contexts (e.g., to determine how many children are at a table).
- providing opportunities for counting objects.
- modeling that we use one counting word/number for each object.
- asking "how many" questions.
- posting a number chart at children's eye level and modeling how to use it.
- playing counting games.

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Number and operations

Uses language to represent number of objects.

This standard reflects the child's growing knowledge and use of vocabulary associated with number and quantity. It provides a building block for mathematical understanding and communicating mathematical ideas. It is important to remember that children can make mathematical observations and connections throughout the day and in all areas of the curriculum.

There are four indicators for this standard:

Indicators The child ...	Examples The child ...
Uses language to compare number (e.g., more/less, greater/fewer, equal to).	• looks at his own and another child's blocks and determines who has more blocks. • compares raisins with a friend's and decides they have the same amount. • asks, "How many more do you have?"
Combines and names how many.	• puts the red, yellow and blue crayons together and counts how many crayons there are. • recognizes that three cars and two trucks is a total of five vehicles.
Separates and names how many.	• participates in finger plays, songs or stories such as *Five Little Monkeys* or *Five Little Ducks* that use backward counting. • plays with a plastic ball and bowling pins and can tell how many fell down and how many are left standing.
Explores everyday fractions.	• says (although not always accurately), "I have a whole orange," or "I have half an apple."

Teacher strategies that promote the use of mathematical language include:

- choosing books involving counting and math concepts during shared reading (see the list in the Resources section for suggested titles).
- engaging children in identifying environmental print with numbers and making environmental print "math" books.
- giving children materials to make collections with and conversing with them about how they sort or classify objects and how many there are.
- engaging children in finger plays, songs and stories that involve counting (forward and backward).
- providing opportunities for counting objects and asking about quantities.
- modeling vocabulary for making comparisons and indicating quantity.
- helping children make mathematical connections at snack time (e.g., asking, "Are there enough crackers for everyone? How many do we need?").

ERIC

Number and operations

Solves problems using number.

This standard refers to a child's ability to identify and solve personally meaningful problems involving number. As children begin to work with numbers to solve problems that are of interest to them, they deepen their understanding of what numbers represent as well as of the relationships among numbers.

There are four indicators for this standard:

Indicators The child ...	Examples The child ...
Names how many there are in a group (up to five objects) without counting.	• recognizes that there are two or three crayons in a box. • rolls a number cube and tells how many dots are on it without counting.
Uses one-to-one correspondence when counting objects.	• can count five blocks in a row and say the number as each block is touched. • gets a carton of milk for each child at the table. • puts a cup with each napkin when setting the table. • holds an additional finger up for each number when counting orally.
Uses one-to-one correspondence to compare the size of a group of objects.	• compares two rows of blocks, two in one line and four in another, and can tell which one has more or less. • matches number of cars to a friend's and says, "I have more."
Estimates, then counts to verify the number of objects.	• while playing in the sand guesses how many cups it would take to fill a bucket and counts the cups of sand put in the bucket. • guesses how many pennies are on the table, then counts the pennies.

Teacher strategies that promote problem solving with numbers include:

- taking advantage of natural contexts during the day (e.g., at snack time or when taking attendance) to encourage problem solving with numbers.
- showing children a glimpse of a small group of items (i.e., 1 to 3) and asking them how many there are.
- supplying the math center with a variety of math games, including teacher-made games, for children to explore.
- engaging children in all kinds of group games (e.g., aiming games, hiding games, guessing games, board games).

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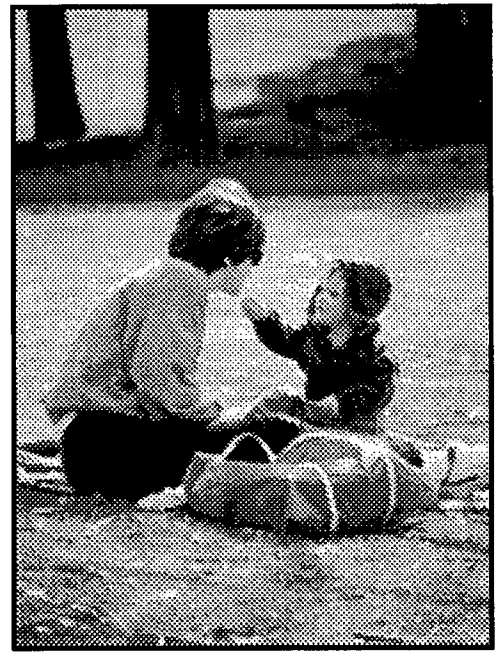
- encouraging children to make up board games or make their own rules for games.
- providing opportunities for children to estimate amounts and test their predictions.
- supporting children in making mathematical observations and connections in the block area and other centers.
- having children vote in appropriate contexts (e.g., in determining the name of the class pet).
- describing real-life situations involving numbers and a problem for children to solve (e.g., saying, "We have 10 cartons of milk for snack but only six straws. How many more straws do we need?).



supply the math center
with a variety of math games
for children to explore

ERIC

Number and operations

Uses numerical representation.

This standard refers to the child's ability to identify and distinguish numerals as well as develop an understanding of ordinal numbers (i.e., numbers that indicate where an object is positioned in a sequence). This skill is another building block of number sense and provides a means for children to communicate mathematical ideas.

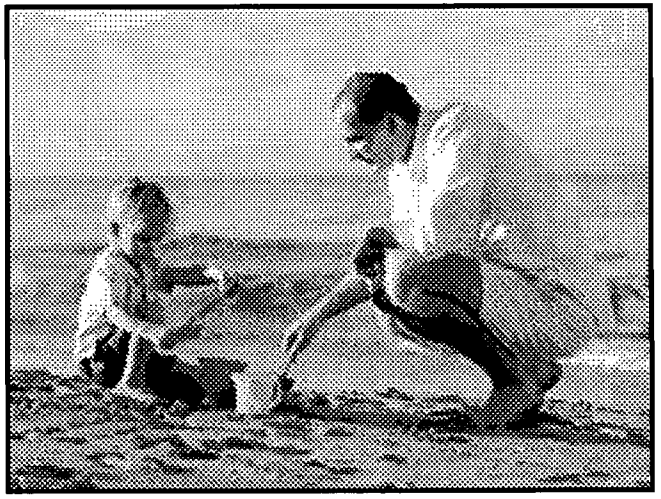
There are five indicators for this standard:

Indicators The child ...	Examples The child ...
Uses drawings to represent number.	• draws pictures showing size (e.g., short/tall) and quantity of family members. • creates a way to keep score during a game. • draws a picture to indicate number of objects or snacks.
Identifies numerals in everyday situations.	• selects numerals on the telephone, calculator or computer. • finds and names numerals in books or on signs.
Uses ordinal numbers (i.e., first, second, last).	• can identify position in a line of children (e.g., who is first, second, last). • can put three objects in a line and tell you which object is first, middle or last. • tells the position of objects (i.e., first, second, last).
Writes some numerals.	• draws numerals in sand. • creates numerals with rolled clay or pipe cleaners. • tries to write how old he or she is. • tries to copy a telephone number.
Matches numeral with quantity.	• when playing a game with a spinner or number cube, correctly counts the spaces on the game board that match the numeral or symbol. • uses magnetic or flannel numerals to show how many marbles there are.

Teacher strategies for promoting use of numerical representation include:

- creating a classroom environment that contains many examples of how numbers are found and used in daily living (e.g., having phone books, receipts, etc., in the writing center; providing a calculator or adding machine in the math center).
- providing developmentally appropriate math software on the computer and having it accessible to children.
- encouraging children to represent numbers in many different media.
- having the children collect environmental print involving number.
- providing opportunities for children for tallying.
- providing resources and opportunities for children to experiment with writing numbers in the writing and art centers.
- providing time and space for children to play a variety of math games.
- posting number lines or charts at children's eye level for their reference.
- modeling the vocabulary of ordinal numbers.
- providing many opportunities for children to represent quantities with objects and exchange their ideas with their peers.

create a classroom environment that contains many examples of how numbers are found and used in daily living



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ERIC

Geometry and spatial sense

Investigates positions and locations.

This standard concerns the child's developing understanding of the relationships between and among objects in the physical world as well as of the child's own spatial sense: the consciousness of where he/she is in relationship to other people and objects.

There are three indicators of this standard:

Indicators The child ...	Examples The child ...
Takes objects apart and puts them together.	• builds with interlocking blocks. • puts lids on containers. • completes simple puzzles.
Uses actions and words to indicate position and location.	• moves self to show positions during play (e.g., under a table, in the tent, between friends). • uses objects to show position (e.g., puts the bears on/off/on top of/above/below/beside the box). • talks about objects that are on/off/under/in front of/behind/ inside/outside/next to/ between/etc. • says when reading *The Three Billy Goats Gruff*, "The big billy goat is on the bridge, and the troll is under the bridge."
Uses actions and words to indicate movement and orientation.	• moves self to show positions (e.g., up, down, forward, backward, around, through, to, from, sideways, across, back and forth, in a straight or curved path). • explains where objects in a room have been moved. • describes how to get to a location using landmarks. • follows a path or moves through an obstacle course. • draws paths or beginnings of a map to show location during play.

Teacher strategies to support children's investigation of positions and locations include:

- having a variety of simple puzzles accessible to children.
- providing simple machines or objects for children to explore that can be taken apart and put together again.
- supplying the classroom with a variety of games and manipulatives that involve interlocking parts (e.g., *Don't Break the Ice*, LEGOs, unifix cubes).
- providing an ample supply of blocks, in all shapes and sizes, as well as

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read aloud texts that involve changing positions and locations — engage children in conversations related to these concepts

adequate space and time for children to play with them and to discuss their actions and creations.
- modeling the vocabulary associated with position and location.
- reading aloud texts that involve changing positions and locations and engaging children in conversations related to these concepts.
- engaging children in movement and hiding games.
- supporting children's attempts to make pictures or models of objects.
- encouraging children to make maps of their environment or to trace paths that they can then represent in pictures with landmarks.

ERIC

Geometry and spatial sense

Explores shapes in the environment.

This standard refers to children's growing awareness and identification of shapes in the environment as well as of dimensions. These abstract concepts become meaningful as children begin to explore shapes and observe their characteristics.

There are four indicators of this standard:

Indicators The child ...	Examples The child ...
Investigates and talks about the characteristics of shapes.	• says, "A circle is round." • discovers that some blocks stack and some blocks roll. • says that squares and triangles have corners and straight sides.
Creates and duplicates three-dimensional and two-dimensional shapes using a variety of materials	• uses blocks to make other shapes or objects. • makes shapes with Play-Doh, pipe cleaners, string or yarn. • attempts to draw shapes and make pictures using shapes. • says, after cutting the sandwich, "Look, I made a triangle (or rectangle) with my sandwich."
Identifies and names some shapes.	• points to or names simple shapes (e.g., box shape, ball shape, circle, triangle, square). • says, "The pizza is round. My piece is triangle-shaped." • says, "The flag is the shape of a rectangle."
Indicates if shapes are alike or different using one or more characteristics	Three-dimensional shapes • says, "A bubble and an orange are both like balls (spheres)." • says, "A block (cube) is shaped like a box." • says, "This ball rolls, but this block does not." Two-dimensional shapes • says, "A triangle has three sides," or "A square has four sides." • says, "A circle is curved (round) like a hula hoop."

Teacher strategies to promote children's exploration of shapes in the environment include:

- providing many opportunities for block play and supporting children's conversations about their actions and experiments.
- asking open-ended questions about children's constructions (e.g., saying, "Why do you think this block keeps falling off the tower?").

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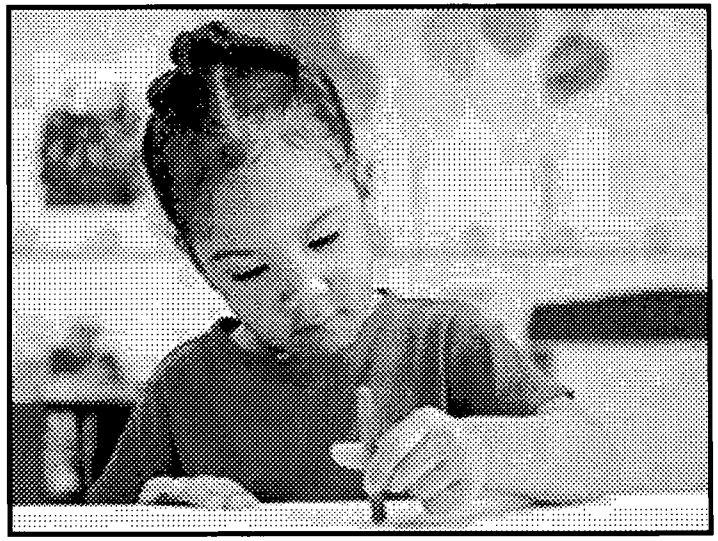
- providing an art/construction area with a wide variety of materials for children to use to explore shapes.
- reading aloud and having available to children texts that illustrate or involve shapes; modeling the vocabulary associated with shapes.
- encouraging children to make observations and comparisons about shapes.
- providing opportunities for children to explore the attributes of shapes (e.g., in block play or the art area).

provide opportunities for block play — support children's conversations about their actions and experiments



ERIC

Patterns and relationships (algebra)

Recognizes relationships in the environment.

Children have a natural curiosity to explore their world and in their explorations begin to make all kinds of relationships, which is a reflection of mathematical thinking. As this thinking develops, children begin to sort, classify and recognize or make patterns, the foundation of algebra.

There are two indicators for this standard:

Indicators The child ...	Examples The child ...
Matches, sorts and regroups objects according to one or more characteristics.	• sorts plastic foods by size, color, shape or category. • matches objects that are alike (e.g., puts all of the two-hole buttons in one pile and four-hole buttons in another). • matches adult animals to their babies. • when playing Go Fish, matches all the cards with threes.
Orders things according to relative differences.	• sorts stuffed animals from smallest to largest. • talks about who is tall, taller, tallest. • arranges a group of blocks from longest to shortest.

Teacher strategies for promoting children's recognition of relationships in the environment include:

- having an adequate supply of interesting materials accessible to children that they can sort and classify. These can be commercial products as well as recyclables and found objects, such as rocks, pine cones, etc.
- providing children many opportunities to sort and classify objects and to make small collections.
- engaging children in conversations about how they are sorting and classifying objects.
- playing games such as What's My Rule? and doing activities that involve children in determining how groups are classified and in identifying patterns.

children can match
adult animals to their babies

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Patterns and relationships (algebra)

Uses patterns in the environment.

This standard reflects the child's growing ability to identify patterns. As the child begins to notice patterns in her surroundings, she also begins to explore making patterns in all kinds of ways, thus building algebraic thinking skills.

There are three indicators for this standard:

Indicators The child ...	Examples The child ...
Recognizes patterns.	• talks about color or pattern in clothing (e.g., says, "I have red and blue stripes on my shirt."). • identifies color patterns that repeat (e.g., red, blue, red, blue).
Duplicates and extends patterns.	• imitates a pattern of sounds and physical movement (e.g., clap, stomp, clap, stomp ...). • continues rhythmic patterns. • completes the patterns in a story (e.g., says, "Brown Bear, Brown Bear, what do you see?"). • repeats a pattern according to size, color, shape, etc., while stringing beads. • predicts what comes next when an adult "reads" the pattern using simple vocabulary (e.g., car, car, boat, car, car, _____).
Creates patterns.	• creates simple patterns with beads or blocks according to color, size or shape. • creates simple patterns when drawing, coloring or painting.

Teacher strategies for promoting children's use of patterns include:

- modeling and discussing patterns.
- engaging children in making body patterns.
- providing materials for children to use for pattern making (these can be recyclables and found objects as well as commercial products such as pattern blocks).
- reading aloud books that involve patterns and having children complete the patterns.
- engaging children in songs, dances, marches and clapping games that involve rhythmic patterns.
- using a pocket chart for creating and displaying patterns with numbers, letters, colors, shapes, etc., and engaging the children in predicting what comes next.

Measurement

Makes comparisons.

This standard refers to the child's increasing ability to make comparisons and identify sequences. This ability relates to both concrete objects and to concepts, such as time, that are very abstract to the child.

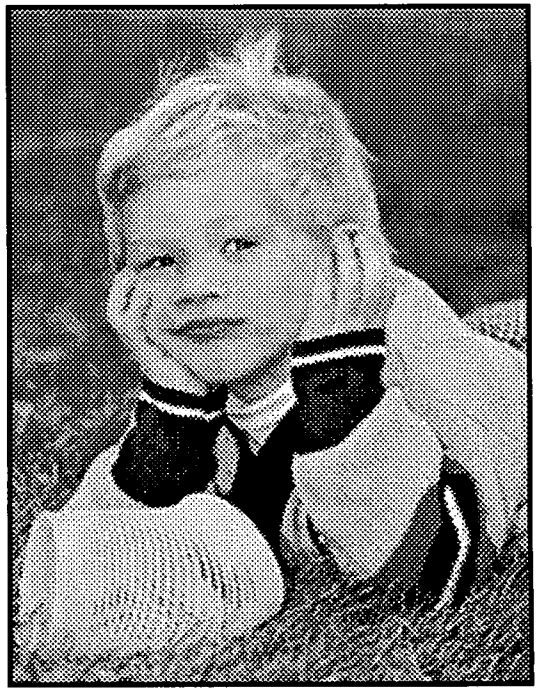
There are five indicators for this standard:

Indicators The child ...	Examples The child ...
Compares objects using measurable features.	• uses words to describe opposites (e.g., big/little, long/short, heavy/light). • chooses the largest snack. • says, "My bucket is heavier." • says, "This crayon is shorter."
Describes measurement.	• talks about an object being longer than another object. • uses a variety of language to describe measurement (e.g., shorter, taller, wider, bigger, heavier, lighter, holds more, hot, cold).
Orders three or more objects according to length or size differences.	• places ribbons in order by length. • puts cars in a row according to size. • puts pans (or measuring cups) inside each other.
Uses language associated with time in everyday situations.	• says, "Snack time comes after rest time." • says, "It's nighttime because it is dark." • says, "I eat breakfast in the morning." • says, "My birthday comes in the summer."
Anticipates, remembers and predicts a sequence of events.	• says, "I brush my teeth before I go to bed." • says, "We went to the library and then the grocery store." • recalls recent events and talks about them (e.g., says, "Yesterday we went to the zoo."). • describes the sequence of activities when going to the grocery store. • tells stories such as *The Three Little Pigs* with events in order. • points out when a familiar story is not told in the correct order.

Teacher strategies to encourage children in making comparisons include:

- modeling vocabulary for making comparisons (e.g., asking, "Is your train longer or shorter than Jennifer's?").
- engaging children in conversations where they are invited to make comparisons.
- reading aloud familiar stories and having children predict what comes next.
- engaging children in retelling familiar stories.
- providing opportunities for children to create "books" illustrating a sequence of events such as a field trip to the fire station.
- taking advantage of daily routines to introduce and model language associated with time.
- using a picture or pocket calendar for children to mark and track important events.

take advantage of daily routines to introduce and model language associated with time



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Measurement

Uses measurement.

This standard refers to the child's increasing ability to engage in the process of measurement. As children explore their environment and recognize that things have measurable properties such as length, height and weight, they learn that these properties can be assessed and compared. As they do so, they begin to implement both standard (e.g., rulers, scales) and nonstandard (e.g., yarn, hands) units of measurement.

There are two indicators for this standard:

Indicators The child ...	Examples The child ...
Explores ways to measure.	• fills a container with solids or liquid (e.g., sand, ice cubes, water). • pours liquid from one container to another container. • sees how many blocks it takes to cover a sheet of paper.
Measures using objects.	• places a string next to an object to measure length. • uses the toy thermometer to measure the "patient's" temperature. • imitates using a ruler when helping dad.

Teacher strategies to promote children's use of measurement include:

- providing different kinds of containers, measuring spoons, cups, balance scales, etc., at the sand or water tables for the children to explore (a tub of beans can also be used).
- asking questions that lead children to make comparisons that can be measured as they engage in center-time activities.
- using classroom situations to engage children in measuring (e.g., asking, "Do you think there's enough room for the aquarium on that table? How can we find out?").
- modeling how measuring tools (i.e., tape measures, rulers, etc.) are used and making them available to children to use for their own purposes.
- encouraging children to estimate amounts, lengths, etc., and then supporting their efforts to take measurements to compare with their estimates.

the child imitates using a ruler when helping dad

Exploring data

Collects, organizes and uses information.

This standard refers to children's ability to collect and organize information for their own purposes. As children begin to sort, classify and compare as part of their daily lives, they start to find means to organize information, or data, in order to use it in meaningful ways. As children's experience with collecting and organizing information increases, they also begin to explore ways to represent and interpret it (e.g., by participating in making charts or graphs).

There are three indicators for this standard:

Indicators The child ...	Examples The child ...
Asks questions to gather information.	• asks, "What is your favorite color?" • asks, "What month is your birthday?" • asks, "What do you like to play outside?" • asks, "How many brothers and sisters do you have?"
Sorts and classifies objects into groups and sometimes explains how the grouping was done.	• puts objects together that have the same use (e.g., blocks, dishes, vehicles, clothes). • explains how the buttons were sorted (e.g., says, "I put the red buttons together.").
Evaluates information to answer questions.	• says two kids have birthdays in July. • says, "I have five trucks and four cars." • says, "More buttons are red."

Teacher strategies to support children's explorations with data include:

- encouraging children to ask questions to gather information.
- providing children many opportunities to sort and classify objects, to make small collections and to discuss how they are organizing them.
- engaging children in conversations about how they are sorting and classifying objects.
- using children's interests to pose questions for them to investigate (e.g., saying, "At circle time, many children were talking about their pets. I wonder how many kinds of pets you all have? How can we find out?").

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Creating a Mathematically Rich Environment

When thinking about enhancing the environment to support children's mathematical thinking, it is important to remember that mathematics can extend across all curricular areas. Just as literacy can be introduced into many different activity centers, so can mathematics. Including math books in the reading center and rulers and graph paper in the writing center, for example, can encourage young children's mathematical thinking as can number charts posted at children's eye level. Supplying the classroom with plentiful and varied materials for children to explore also supports children's mathematical development and invites hands-on investigations and problem solving. A math center that includes a wide variety of math games, including teacher-made games, manipulatives, pattern blocks, etc., and a well-supplied block area can provide children with wonderful opportunities to extend their mathematical thinking. Providing a supply of found materials (e.g., rocks, shells, pine cones) for children to assemble small collections with is also helpful. In fact, as teachers organize their environment to take advantage of mathematical potential, it becomes clear that math is — or can be — everywhere!

supply the classroom with plentiful and varied materials for children to explore

Involving Parents and Families

Partnering with parents and families to support children's mathematical development can be both rewarding and fun! Sharing math games to be played at home, or lending books in literacy bags that feature numbers and math concepts as well as story books are wonderful ways to involve families in the math curriculum. In addition, collecting environmental print or collecting information for class charts and graphs can turn into family projects. There are many resources for educators interested in involving parents in supporting their children's mathematical thinking, many of which are included in the next few pages. The Parents As Teachers program is also a wonderful resource; contact your school district for more information about this exemplary program.

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Resources

Books:

Math

Althouse, R. (1994). *Investigating mathematics with young children.* New York: Teachers College Press.

Andrews, A., and Trafton, P. (2002). *Little kids — Powerful problem solvers: Math stories from a kindergarten classroom.* Portsmouth, NH: Heinemann.

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- Children's Defense Fund: www.childrensdefense.org
- Conference on Standards for Preschool and Kindergarten Mathematics Education: www.gse.buffalo.edu/org/conference/
- Connections Newsletters: www.canr.uconn.edu/ces/child
- Early Childhood Education on Line: www.ume.maine.edu/ECEOL-L
- Early Childhood Educators' and Family Web Corner: users.stargate.net/~cokids
- Early Childhood News: www.earlychildhoodnews.com
- ERIC/EECE Clearing House on Elementary and Early Childhood Education: ericeece.org/publications.html
- Everything for Early Childhood Education Preschool-Grade 2: www.edupuppy.com
- Licensing of Child-Care Facilities in Missouri: www.health.state.mo.us/LicensingAndCertification/Dcc-gh.html
- Math and Children's Literature: www.carolhurst.com/subjects/math/math.html
- Math Forum: mathforum.org/library/levels/p/
- Missouri Department of Conservation: www.conservation.state.mo.us/teacher
- National Association for the Education of Young Children (NAEYC): www.naeyc.org
- National Association for Family Child Care: www.nafcc.org
- National Child Care Information Center: www.nccic.org
- National Council of Supervisors of Mathematics: ncsmonline.org
- National Council of Teachers of Mathematics: www.nctm.org/
- "On-Lion" for Kids: www2.nypl.org/home/branch/kids/
- Project Construct National Center: www.projectconstruct.org

- U.S. Department of Education, Office of Educational Research and Improvement and National Institute on Early Childhood Development and Education: www.ed.gov/pubs/EarlyMath/

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- *The Buzz: Cool Ideas for Child Care Providers* (4 issues per year)
  Center for Innovations in Special Education
  152 Parkade Plaza, 601 Business Loop 70 W
  Columbia MO 65211-8020
  1-800-976-2473
- *Early Childhood News* (6 issues per year)
  330 Progress Road
  Dayton OH 45449
  1-800-607-4410
- *Scholastic Early Childhood Today* (8 issues per year)
  P.O. Box 54814
  Boulder CO 80322-4814
  1-800-544-2917
- *Young Children* (6 issues per year)
  National Association for the Education of Young Children (NAEYC)
  1509 16th Street, NW
  Washington DC 20036-2460
  1-800-424-2460

Other materials:

- NAEYC brochure for parents: *More than 1, 2, 3: The real basics of mathematics.* (McCracken, J.B.) No. 575. (See above address for ordering.)
- U.S. government booklet for parents: *Early Childhood: Where Learning Begins Mathematics.* (Print copies from www.ed.gov/pubs/EarlyMath/.)

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Early Childhood Section
P.O. Box 480, Jefferson City, MO 65102-0480
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"Making a positive difference through education and service"

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Parent Handbook:

Early Mathematics

Missouri Department of Elementary and Secondary Education ■ Early Childhood Section

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The Missouri Department of Elementary and Secondary Education appreciates the cooperation of the Parents as Teachers National Center in developing this booklet.

For additional copies of this handbook, contact the Missouri Department of Elementary and Secondary Education, Early Childhood Section, at (573) 751-2095, or visit the DESE Web site at dese.mo.gov. You may also contact the Parents as Teachers National Center at 1-866-PAT4YOU or 1-866-728-4968, or visit their Web site at www.patnc.org.

Introduction

Please join us in helping your child get off to the best possible start in life by guiding her development in mathematics. You are your child's first and most important teacher. Your child already has a wealth of informal knowledge about mathematics as a result of her everyday experiences and the strategies she creates to deal with events in her life.

The Missouri Department of Elementary and Secondary Education, along with a broad- based group of individuals whose backgrounds are representative of the early childhood community in Missouri, developed a set of standards of what most children should know and be able to do by the time they enter kindergarten. The standards are intended to be used in a variety of early childhood settings by a variety of people, including parents, parent educators, child-care providers and Head Start and public or private schoolteachers. They are consistent with current research and recommendations from other state and national initiatives.

Not all children learn at the same rate. Just as we recognize that adults are individually different, we also recognize that variability in children is normal. The standards are not intended to be used to determine if a child is "ready" to enter kindergarten but are goals for adults to use in supporting the development of preschool children.

It is important for your child to develop confidence in her ability to understand and use mathematics. When she uses math to solve problems, your child also develops traits that will help her be successful in other areas of life including curiosity, problem solving, organization, imagination and persistence.

Your child learns math concepts through playing with objects and people, solving problems, and making observations about her everyday world. The rate at which she learns math depends a lot on the opportunities available to her. She needs to explore ideas related to patterns, shapes, numbers and space.

Mathematics is learned in steps. Each step is based upon knowledge gained during the previous step. If your child fails to understand a step, she will have a harder time grasping the next stage. Before your child can understand abstract math concepts, she needs to have a lot of experience playing with objects she can see and feel. She needs to hear math language and see how it is used.

You can help by watching and listening to your child to see how much she already understands about math and by asking questions that will encourage her to make new discoveries. You also can provide materials and opportunities that will encourage math learning and can talk to her about simple concepts such as size, weight, distance, time and counting.

Mathematics Standards (Goals) for the Preschool Years

Below are the Standards (Goals) for Pre-K Mathematics as identified by the Missouri Department of Elementary and Secondary Education, Early Childhood Section.

Number and operations

- Uses number to show quantity.
- Uses language to represent number of objects.
- Solves problems using number.
- Uses numerical representation.

Geometry and spatial sense

- Investigates positions and locations.
- Explores shapes in the environment.

Patterns and relationships

- Recognizes relationships in the environment.
- Uses patterns in the environment.

Measurement

- Makes comparisons.
- Uses measurement.

Exploring data

- Collects, organizes and uses information.

Pre-K Mathematics Standards (Goals): Number and Operations

Number and operations refers to more than counting. It is number sense, or the understanding of numbers, ways of representing numbers, relationships among numbers and number systems. It involves the ability to think and work with numbers easily and to understand their uses (i.e., counting, measuring, ordering and labeling) and relationships. To understand the concept of number, your child needs to see it represented in many ways. For example, to understand the concept of "3," it would be helpful for your child to see and feel three blocks, to see a picture of three blocks, and to see the numeral "3."

Count with understanding: attach a number name to a series of objects; understand that the number spoken when tagging or touching the last object also identifies the total number in the group

Estimate: make a guess about the amount or size of something

Everyday fractions: numbers that represent parts of whole objects in a child's environment (e.g., half a sandwich)

Number: a unit belonging to a mathematical system used for counting, measuring, ordering and labeling; the meaning of a number word or numeral

Number sense: the ability to understand numbers, ways of representing numbers and relationships among numbers.

Numerals: conventional symbols that represent numbers (e.g., "1" is the numeral for "one")

One-to-one correspondence: linking a single number name with one object, and only one, at a time

Operations on numbers: basic number combinations and strategies for computing, such as addition and subtraction

Ordinal numbers: numbers that indicate the position of an object in a sequence, (i.e., first, second, third)

Quantity: how many units are in a set (i.e., an amount or the result of counting)

Rote count: recite the names of the numerals in order or sequence (e.g., singing a counting song)

Pre-K Mathematics Standards (Goals): Number and Operations

Standard (Goal):

Uses number to show quantity.

Look for your child to ...	Your child may ...
Show interest in counting and quantity.	Use fingers to indicate the number (e.g., holds up five fingers to show age). Repeat counting rhymes and singing games with numbers. Count familiar objects (e.g., family members, friends, toys) although not always accurately. Ask how many.

You can support your child ...

Make an effort to count things out loud when you are with your child. Count steps as you climb them, people standing in line, books on the shelf, cookies on the plate, favorite toys, etc.

Sing songs with your child that have numbers in them at bedtime and while you're riding in the car, shopping and doing chores (e.g., sing, "This Old Man," "Three Little Kittens," "Two in a Bed," "The Ants Go Marching," and "Rock Around the Clock."

Read number books to your child.

Have your child bring you a specific number of books to read. Help him count the number of objects or pictures on each page.

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Look for your child to ...	Your child may ...
Develop an increasing ability to rote count in sequence.	Count from one to 10 or beyond.

You can support your child ...

Give your child many opportunities to count aloud. Play games with him that encourage him to count to 10, such as hide and seek and tag.

Have your child jump or hop while you count. Have him stop jumping when you stop counting. Switch roles with your child. Vary the number you count to.

Read books and sing songs to your child that include rote counting.

Look for your child to ...	Your child may ...
Count objects with understanding.	Count five items accurately (e.g., blocks, crayons, cars). Hand one to five objects upon request (e.g., say, "Joe, hand me three potatoes.").

You can support your child ...

Take turns counting how many times each of you can toss a beanbag or ball into a basket.

Play games with your child that involve counting or keeping score (e.g., hide and seek, board games, tag, tee-ball, jump rope, hopscotch and jacks).

At story time, have your child read you the page numbers in the book.

Have your child count different parts of his body (e.g., eyes, mouth, ears, hands, fingers, toes).

Take your child to the local library and tell him to select a specific number of books to check out. Help him count them as he places them on the counter to be scanned.

When you and your child count things, help him understand that the last number you say is also the total number of objects (e.g., say, "1, 2, 3, 4 pennies. There are **four** pennies.").

Pre-K Mathematics Standards (Goals): Number and Operations

Standard (Goal):

Uses language to represent number of objects.

Look for your child to ...	Your child may ...
Use language to compare number (e.g., more/less, greater/fewer, equal to).	Look at her own and another child's blocks and determine who has more blocks. Compare raisins with a friend's and decide they have the same amount. Ask, "How many more do you have?" **You can support your child ...** Build block towers with your child and talk about which tower has a greater number of blocks and which has fewer. Ask your child how he determined this. Sort multicolored candy or cereal into groups by color. Ask your child, "Which color has the most number? Which has the fewest?" Children enjoy working with oversized objects. Fill a large container with objects to sort (e.g., large interlocking blocks, baskets, baseball caps, farm animals, a variety of balls, plastic food, large toy vehicles). After your child sorts the objects, talk with him about which group has more than another, which has fewest, which have equal numbers.
Look for your child to ... Combine and name how many.	**Your child may ...** Put the red, yellow and blue crayons together and tell how many crayons there are. Recognize that three cars and two trucks is a total of five vehicles. **You can support your child ...** Play store with your child. Say, "Miss, I'd like to buy these two apples and these three bananas. How many things am I buying?" Have your child help sort laundry by the person who wears it. Then ask, "How many socks do we have in this load?"

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Look for your child to ...	You can support your child ...
Combine and name how many. *(continued)*	Suggest objects your child could collect and count – stuffed animals, toy cars, shells, rocks, coins or small books. Have her sort the objects in any way that she likes. Help her count the items in each group and tell how many there are. Set the table with your child. Then ask her to tell you how many pieces of silverware are on the table.
Look for your child to ... Separate and name how many.	**Your child may ...** Participate in finger plays, songs or stories such as "Five Little Monkeys" or "Five Little Ducks" that use backward counting. Play with a plastic ball and bowling pins and tell how many fell down and how many are left standing. **You can support your child ...** If your child has learned to count by rote with ease, make it more challenging by having her count backward or start counting from numbers other than one. Put five small objects on a tray. Help your child count them. Cover the objects with a cloth and slide your hand under the cloth to remove one or two of the objects. Have your child pull off the cloth, and ask her how many objects are left. Teach your child songs that include counting backward. Make up new words to old favorites, such as "Ten bottles of milk in the fridge." Tell your child you will read her three books. After you read the first one, ask her how many are left. Draw a picture of a fishbowl on a white piece of paper. Put a few goldfish-shaped snack crackers inside the "bowl," and have your child count them. Tell her to take one out, eat it, and count the remaining crackers.

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Look for your child to ...	Your child may ...
Explore everyday fractions.	Say (although not always accurately), "I have a whole orange," or "I have half an apple."

You can support your child ...

Give your child a wide variety of measuring cups and spoons and let him explore them with water and dry ingredients such as sand, dirt, dry oatmeal or uncooked pasta.

If you notice your child breaking a cookie or cracker into two pieces, talk to him about how two halves make a whole.

Divide an orange into sections and talk about it in terms of fractions (e.g., say, "I split the orange into eight pieces. I'm giving you an eighth of the orange."

Help your child cut out magazine pictures of symmetrical objects such as balls, faces or apples that look the same on both sides when cut in half. Cut the pictures into two equal pieces, and talk to your child about how you cut them into halves. Mix the pictures up and see if he can match the halves.

Cooking provides opportunities to talk about fractions. Read recipes aloud to your child, and include him in food preparation. When he hears terms such as "half of a cup" or "one-fourth of a teaspoon," he will be familiar with them when he learns them in school.

Play bakery or restaurant with your child and have him cut clay or Play-Doh pies into pieces to share equally among his "customers."

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Pre-K Mathematics Standards (Goals): Number and Operations

Standard (Goal):

Solves problems using number.

Look for your child to ...	Your child may ...
Name how many there are in a group (up to five objects) without counting.	Recognize that there are two or three crayons in a box. Roll a number cube and tell how many dots are on it without counting.

You can support your child ...

Play dominoes with your child. Ask him to tell you the number of dots on a tile without counting.

Play board games that use dice with your child.

Play games with your child where you put small objects into a jar and have him guess how many are there. Take turns putting in objects and guessing how many.

Count objects out loud when your child is around. Have her count with you.

Look for your child to ...	Your child may ...
Use one-to-one correspondence when counting objects.	Count five blocks in a row, saying the number as each block is touched. Get a carton of milk for each child at the table. Put a cup with each napkin when setting the table. Hold an additional finger up for each number when counting orally.

You can support your child ...

Have your child set the table and put one fork, one plate and one glass at each place.

Have your child pass out something such as cookies or game pieces. Tell him to give one to each person.

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Look for your child to ...	You can support your child ...
Use one-to-one correspondence when counting objects. *(continued)*	Set up a "counting table" with many small objects on it. Have your child count the objects by touching them as he says the numbers. Tap out a number of drumbeats on an oatmeal container or toy drum. Have your child tap out the same number on his oatmeal container or drum. Take turns being the leader. Cut a hole in the lids of five empty margarine containers. Put one self-stick dot on one lid, two on another, three on another, etc. Have your child use tweezers to pick up popcorn kernels and put the corresponding number of kernels into each container. Model the use of numbers in daily life by counting aloud the number of plates while setting the table, number of teaspoons of vanilla in a recipe, number of seconds your child brushes his teeth, number of dollar bills you give to a cashier, etc.
Look for your child to ...	**Your child may ...**
Use one-to-one correspondence to compare the size of groups of objects.	Compare two rows of blocks, two in one line and four in another, and tell which one has more or less. Match number of cars to a friend's and say, "I have more."
	You can support your child ...
	Put five items of one kind and three of another kind on a table. For example, put five blocks and three toy cars on the table. Mix them up and have your child sort the items. Ask, "Which group has more? Which has less?" Spread four grapes out in a line. Place four grapes close together in a line under the first line. Ask, "Are there more grapes here (in the top line) or here (in the bottom line)?" Play a game of "dinosaur bones" with your child. Put 12 bone-shaped dog biscuits into a plastic bag. Take turns rolling a die. Count the number of dots on the die and take that number of bones out of the bag. See who has the most bones when the bag is empty. Help your child make a book of objects in which he is interested. For example, he could cut out magazine pictures of cars and glue them to construction paper. Have him make a page for each type of object (i.e., a page for pets, a page for trucks). Attach the pages with string or staples and have him count the number of pictures on each page or in the book. Ask, "Which page has the most?"

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Look for your child to ...	Your child may ...
Estimate, then count to verify the number of objects.	While playing in the sand, guess how many cups it would take to fill a bucket and count the cups of sand put in the bucket. Guess how many pennies are on the table, then count the pennies.
	You can support your child ...
	Play guessing games frequently with your child. Guess how many steps it will take to cross the street, how many French fries are in your bag, how many children will be at the playground. Help him count them to see if you are correct. Tell your child to guess how many 12-ounce cans it will take to fill a 2-liter bottle, then you take a guess. Help your child fill a can with water and pour it into the bottle. Have him continue filling the can and pouring until the bottle is full. How many cans did it take? Measure your child's height, then have him guess yours. Measure your height and see how close his estimate was. Fill two identical jars with dried pasta – one with large pasta and one with small. Have your child guess which one has more pieces. Give your child a small plastic cup, a set of measuring spoons and a bowl of dried beans or sand. Have him guess how many tablespoons of beans it would take to fill the cup. Help him count the tablespoons as he scoops up the beans and pours them into the cup. Try it again with a smaller or larger cup.

Pre-K Mathematics Standards (Goals): Number and Operations

Standard (Goal):

Uses numerical representation.

Look for your child to ...	You can support your child ...
Use drawings to represent number.	Draw pictures showing size (short/tall) and number of family members. Create a way to keep score during a game. Draw a picture to indicate number of objects or snacks.
	You can support your child ... Provide drawing tools (e.g., crayons, markers, pencils, chalk, paint) and a variety of paper for your child. Play games that encourage keeping score with your child, such as shooting baskets, coin flips or bingo. Think of ways, other than numbers, to keep score, such as marking on a piece of paper or giving a button to the winner of the round. Draw with your child. Take turns deciding what to draw; include pictures that represent math concepts (e.g., say, "Let's draw a big house and a little house," or "Draw three things you want for your birthday.").
Look for your child to ... Identify numerals in everyday situations.	**Your child may ...** Select numerals on the telephone, calculator or computer. Find and name numerals in books or on signs.
	You can support your child ... Buy or make a weekly calendar. Provide stickers for your child to mark special days or draw stars. Talk about the numeral date of special days. Remove several number cards from a deck of playing cards. Provide a small bowl of buttons, candies or other small objects. Take turns with your child, choosing a card, naming the numeral shown on the card, and laying the corresponding number of objects next to the card. As you drive around town, help your child look for numerals on street and store signs and on license plates. Call out the numbers as you find them. Tell your child to find a 1, then a 2, etc.

Look for your child to ...	You can support your child ...
Identify numerals in everyday situations. *(continued)*	Point out your address numbers to your child (e.g., say, "These numbers on our mailbox are 4-3-6-7. We live at 4367 Maple Drive.").
	Write down the phone number of a friend or relative and have your child touch the numbers on the phone as you call the person. Give her a toy phone and have her pretend to dial the numerals as you read them aloud.
	Help your child complete simple connect-the-dot pictures (homemade or purchased).
	Have your child take a number at the deli or post office and help her to read the numerals.
	Point out numerals to your child in books and on signs, clocks, scales, rulers, money and dials.
Look for your child to ... Use ordinal numbers.	**Your child may ...** Identify position in a line of children (e.g., who is first, second, last).
	Put three objects in a line and tell which object is first, middle or last.
	Tell the position of objects (i.e., first, second, last).
	You can support your child ... With your child, create a racetrack using blocks. Have a race using toy cars. Talk with your child about which car came in first, second, third and fourth.
	String wooden beads to make a necklace or bracelet. Have your child make a matching one by telling her, "Put on a blue bead first, a green one second, a red one third, etc."
	Insert three blocks of different colors into a cardboard tube. Slowly tilt the tube so the blocks come out. Have your child guess which color block will come out first, second and last.
	When your child is getting dressed, ask, "What should you put on first? What should you put on second? What comes next?"
Look for your child to ... Write some numerals.	**Your child may ...** Draw numerals in sand.
	Create numerals with rolled clay or pipe cleaners.
	Try to write how old she is.
	Try to copy her telephone number.

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Look for your child to ...	You can support your child ...
Write some numerals. *(continued)*	Have your child trace numerals onto tracing paper if she is able. If not, draw numerals onto paper yourself. With your child, cover the numerals with play dough to create them in another form. At bath time, squirt some shaving cream on the wall next to the tub. Tell her to draw two big eyes. Show her how to write the numeral "2." Have her copy it next to yours. Tell her to draw one ball and to write the numeral "1" next to it. Put some cornmeal or pudding on a cookie sheet or tray. With your child, draw numerals on the cookie sheet using your fingers. Have her name a numeral for you to draw, then name one for her. Draw a numeral on a piece of paper and show it to your child. Flip the paper over and see if she can copy it from memory.

Look for your child to ...	Your child may ... / You can support your child ...
Match numeral with quantity.	**Your child may ...** When playing a game with a spinner or number cube, correctly count the spaces on the game board that match the numeral/symbol. Use magnetic or flannel numerals to show how many marbles there are. **You can support your child ...** Take five index cards. On the left side of each, write a numeral from 1 to 5. On the right side, use a hole punch to create a matching number of holes. Take turns with your child counting the holes in the card and naming the matching numerals. If your child is able, give her an index card with a numeral on it and let her punch the matching number of holes in the card. Divide a paper plate into six equal sections and label them from 1 to 6. Draw the corresponding number of dots in each section. Write a numeral from 1 to 6 on each of six spring-type clothespins. Take turns with your child clipping the clothespins to their matching sections. Provide paper plates that you have labeled from 1 through 4. Have your child put the correct number of dried noodles on each plate. If you have stairs inside or outside your home, use masking tape to number them. With your child, count the stairs as you walk up and down them. To help your child make the connection between numerals and counting, create a "dinosaur bones" poster. Write the numerals from 0 to 5 on a piece of poster board. In columns under each numeral, glue the corresponding number of bone-shaped dog biscuits. Have your child count out the "bones" under each numeral.

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Pre-K Mathematics Standards (Goals): Geometry and Spatial Sense

Geometry is the area of math that involves shape, size, position, direction and movement. It describes and classifies our physical world. Spatial sense is a child's awareness of himself in relation to the people and objects around him. It includes knowing boundaries, arrangements and positions.

Attribute: a characteristic or feature of an object such as color, size, shape, weight and number of sides

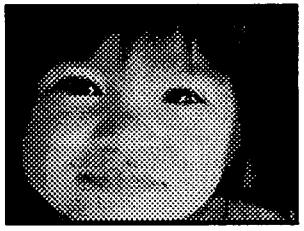
Location: where an object is in space

Orientation: the position or arrangement of an object

Position: the place where an object or person is in relation to others

Shape: the form of an object

- **Three-dimensional:** objects that have length, width and depth; solid figures such as cubes, spheres and cylinders
- **Two-dimensional:** objects that have length and width but not depth; shapes such as squares, triangles and circles



Standard (Goal):

Investigates positions and locations.

Look for your child to ...	Your child may ... / You can support your child ...
Take objects apart and put them together.	**Your child may ...** Build with interlocking blocks. Put lids on containers. Complete simple puzzles. **You can support your child ...** Provide a variety of kitchen containers and saucepans. Put all of the lids in a box. Have your child choose a lid and find the container or saucepan that goes with it. Provide pegs and pegboards or puzzles where one piece fits into only one space.

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Look for your child to ...	You can support your child ...
Take objects apart and put them together. *(continued)*	Make a puzzle with your child. Help him cut out a picture from a magazine and glue it to a piece of lightweight cardboard. Cut it into three or four pictures. See if your child can put the puzzle together. For more challenge, turn the pieces over so the picture doesn't show and have him put the puzzle together by matching the shapes. Provide markers and paper for your child. Have him remove the lids of the markers before he uses them. Have him put them back on when he is finished with them. Help your child flatten out clay or Play-Doh onto a cookie sheet. Show him how to cut out simple shapes with a cookie cutter. Have him put the shapes back into the holes.

Look for your child to ...	Your child may ...	You can support your child ...
Use actions and words to indicate position and location.	Talk about objects that are on/off/under/in front of/behind/inside/outside/next to/between/etc. Move himself to show positions, such as under a table or in the tent, during play. Use objects to show position (e.g., put the bears on/off/on top of/above/below/beside the box). Say when reading *The Three Billy Goats Gruff*, "The Big Billy Goat is on the bridge, and the Troll is under the bridge."	Take turns with your child tossing a beanbag or small stuffed animal into an empty laundry basket. Talk about where the bag lands in relation to the basket (e.g., **beside** the basket, **in** the basket, **behind** the basket or **at** a corner of the basket. Set up an obstacle course for your child and talk about how he is crawling **under** the table, **through** the box, **over** the cushion, etc. Have your child act out a story as you read it. Emphasize positional words. Your child can crawl **under** a table, step **over** a doormat, sit **on** a chair, etc. Play Simon Says with your child. Tell him to put his hands **on** his hips, **above** his head, **behind** his back, **under** his chin, etc. As your child sets up furniture in a doll house, animals in a farm set, or toy cars on a road, help him describe where he is putting them using positional words.

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Look for your child to ...	You can support your child ...
Use actions and words to indicate position and location. *(continued)*	Spread a few familiar objects on the floor in front of your child. Describe an object using positional words (e.g., say, "I spy something that is **between** the block and the spoon," or "I spy something that is **behind** the keys." See if your child can guess the object. Take turns giving clues and guessing.

Look for your child to ...	Your child may ...	You can support your child ...
Use actions and words to indicate movement and orientation.	Move himself to show positions (e.g., up, down, forward, backward, around, through, to, from, sideways, across, back and forth, in a straight or curved path). Explain where objects in a room have been moved. Describe how to get to a location using landmarks. Follow a path or move through an obstacle course. Draw paths or beginnings of a map to show location during play.	Have your child give you specific directions. For example, have him tell you how to get from your bed to the kitchen sink (e.g., "Walk forward. Stop. Turn right, toward the door. Walk forward. You went too far. Walk backward"). Take turns giving directions. Talk about how far away you are from your child. Have him walk toward you while counting the number of steps it takes to reach you. Read maps with your child. Point out where you are and where you are going. Help your child make a three-dimensional map of a room in your house using small objects to represent real objects in the room. Have him place the objects on butcher paper or poster board. Tape several pieces of yarn of different colors to the paper. Take turns with your child using the yarn to show different routes you could use to walk around the room. Help him decide which routes are longer and which are shorter.

Pre-K Mathematics Standards (Goals): Geometry and Spatial Sense

Standard (Goal):

Explores shapes in the environment.

Look for your child to ...	You can support your child ...
Investigate and talk about the characteristics of shapes.	**Your child may ...** Say, "A circle is round." Discover some blocks stack and some blocks roll. Say that squares and triangles have corners and straight sides. **You can support your child ...** Trace around objects and have your child match the objects to their outlines. Play blocks with your child. Talk about the different characteristics of the blocks (i.e., cube, triangle, cylinder). Read books to your child about shapes and talk about them. Cut colored paper into various shapes. Have your child sort them by shape or color, then by both shape and color. With your child, create a variety of prints using kitchen utensils such as forks, spoons, spatulas, lids, slotted spoons and cheese graters. Dip the utensils into washable paint and press them onto paper. Talk about the shapes you see in the prints.
Create and duplicate 2- and 3-dimensional shapes using a variety of materials.	**Your child may ...** Use blocks to make other shapes or objects. Make shapes with clay or Play-Doh, pipe cleaners, string or yarn. Attempt to draw shapes and make pictures using shapes. Say after cutting the sandwich, "Look, I made a triangle (or rectangle) with my sandwich." **You can support your child ...** With your child, make three-dimensional shapes using pipe cleaners or toothpicks and miniature marshmallows.

Look for your child to ...	You can support your child ...
Create and duplicate 2- and 3-dimensional shapes using a variety of materials. *(continued)*	Cut three-dimensional shapes out of sponges. Name the shapes and describe them to your child as she explores them. Help your child make prints by dipping the sponge shapes into paint and pressing them onto paper. Name the two-dimensional shapes you make. With your child, create shapes from clay or Play-Doh, cookie dough, pipe cleaners, heavy string, sponges, or your bodies. Trace shapes onto paper. Have your child mix two envelopes of unflavored gelatin with two boxes of flavored gelatin. Add two cups of boiling water, and stir the mixture until the gelatin dissolves. Pour it into a small pan and chill until firm. Help your child cut the gelatin into shapes with a plastic knife or cookie cutters. Enjoy the gelatin! With your child, draw circles, triangles, squares and rectangles in sand or salt on a cookie sheet.
Identify and name some shapes.	**Your child may ...** Point to or name simple shapes (e.g., box shape, ball shape, circle, triangle, square). Say, "The pizza is round. My piece is triangle-shaped." Say, "The flag is the shape of a rectangle." **You can support your child ...** Go on a shape hunt with your child, both inside and outside your home. Look for shapes of all kinds – either in nature or formed by objects or even people. Say to your child, "I am looking for something shaped like a ball." Have your child collect round objects throughout the home. You can make it easier by hiding various objects beforehand. Play this game with other three-dimensional shapes, too. Talk about the shapes of food during mealtime (e.g., say, "The pizza is a circle, and then we cut it into triangles," or "I'm going to cut your sandwich into two halves. Do you want triangles or rectangles?"). Make large shape outlines by gluing heavy yarn or rope to cardboard. With your child, feel the outline of the shapes. Then, have your child close her eyes and guess the shape by tracing the outlines with her fingers. Take turns guessing the shape.

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Look for your child to ...	You can support your child ...
Identify and name some shapes. *(continued)*	Put an object that represents a solid shape (e.g., a block, a cone-shaped toy, a small can, a ball) into the toe of a sock. Have your child reach into the sock and guess the shape of the object without looking. Tell her to describe what the shape feels like. Take turns putting an object into the sock and guessing the shapes. Help your child look for "shapes" in clouds.
Look for your child to ...	**Your child may ...**
Indicate if shapes are alike or different using one or more characteristic.	*Three-dimensional shapes* Say, "A bubble and an orange are both like balls (spheres)." Say, "A block (cube) is shaped like a box." Say, "This ball rolls, but this block does not." *Two-dimensional shapes* Say, "A triangle has three sides," or "A square has four sides." Say, "A circle is curved (round) like a hula hoop." **You can support your child ...** Put some sand into a large pan. Wet the sand enough so that it can be easily shaped. With your child, create spheres, cylinders, cubes and cones, then describe them (e.g., say, "Look, I made a ball! It has curves but no corners. I made an ice cream cone. It has a point at the end"). Collect round and rectangular three-dimensional objects (e.g., different types of balls, oranges, large beads, blocks, small boxes, large dice). Take turns with your child trying to roll the objects and deciding if the object has curves or angles. Have your child shine a flashlight onto a wall in a darkened room. Hold a ball or an orange in front of the flashlight. Ask your child to describe the shape of the ball and then the shape of its shadow. Make a ball or other three-dimensional shape out of clay or Play-Doh. Have your child make the same shape and ask him how his shape is the same as yours. Ask him if his shape is the same as a ball or as a box. Ask him why or why not.

Pre-K Mathematics Standards (Goals): Patterns and Relationships (algebra)

Your child may begin to identify and examine simple patterns, extend them, and make simple predictions about them.

Extend: continue a pattern beyond what is shown

Match: find two objects that have at least one characteristic in common

Order: arrange objects or numbers to show a progressive increase or decrease of a specific characteristic

Pattern: a sequence of colors, shapes, objects, sounds or movements that repeats again and again in a regular arrangement; patterns are a way for young students to recognize order and to organize their world

Regroup: to place or assign objects in two or more groups using a different characteristic than was used the first time the objects were grouped

Relative difference: the specific characteristic that differs among a group of objects (e.g., size)

Sort: place or assign objects in two or more groups on a basis of at least one characteristic

Standard (Goal):

Recognizes relationships in the environment.

Look for your child to ...	Your child may ...
Match, sort and regroup objects according to one or more characteristic.	Sort plastic foods by size, color, shape or category. Match objects that are alike (e.g., two-hole buttons, four-hole buttons). Match adult animals to their babies. When playing Go Fish, match all the cards with threes. **You can support your child ...** Combine dried beans, rice and salt into a small bowl. Have your child use a strainer and colander to help separate and sort the ingredients. When you have photos developed, order a duplicate set. Lay the photos on a table and have your child match them up. He will especially enjoy matching the pictures that are of him.

Look for your child to ...	Your child may ...
Match, sort and regroup objects according to one or more characteristic.	Give your child a divided container such as a muffin pan or egg carton. Collect an assortment of small objects (e.g., buttons, toy cars, blocks, old keys or small magazine pictures cut out and glued to construction paper). Have him sort the objects however he likes. Partially fill six containers to make pairs of shakers (e.g., two with rice, two with blocks and two with dried beans). Have your child match the ones that make the same sound when he shakes them. Draw a line down the center of a piece of construction paper. Lay out pieces of dried pasta, dried beans and colored cut-out shapes. Have your child place one of the objects anywhere on her side of the paper. Find the same object and lay it on your side of the paper in the same place. Take turns choosing objects and imitating each other. At the end, compare the two sides of the paper and see if they look the same.

Look for your child to ...	Your child may ...
Order things according to relative differences.	Sort stuffed animals from smallest to largest. Talk about who is tall, taller, tallest. Arrange a group of blocks from longest to shortest. **You can support your child ...** Collect boxes of various sizes that fit inside each other. Put an object or toy into the smallest box, and wrap the box in colored gift paper. Put the box inside the next biggest one, and wrap that box. Continue putting each box into the next largest one and wrapping it until they are all in one big box. Have your child open each box until he finds the object. Then help him line the boxes up or stack them from smallest to largest. Have your child line up his books in order by size or from most favorite to least favorite. Have your child line up family members from shortest to tallest. Make block towers with your child. Talk about which towers are short and which are tall. With your child, create long and short "snakes" from clay or Play-Doh. Have him arrange the snakes from shortest to longest. Have your child make a rubber band longer or shorter by stretching it. Make a collection of objects that come in large and small sizes (e.g., socks, toothbrushes, silverware, cups, combs, stuffed animals). Have your child sort the items and tell you about his sorting. Provide nesting toys of graduated sizes for your child.

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Pre-K Mathematics Standards (Goals): Patterns and Relationships

Standard (Goal):

Uses patterns in the environment.

Look for your child to ...	Your child may ...
Recognize patterns.	Talk about color or pattern in clothing (e.g., say, "I have red and blue stripes on my shirt."). Identify color patterns that repeat (e.g., red, blue, red, blue). **You can support your child ...** Help your child look for patterns in nature, in stores and at home. Go on a "pattern walk." Show your child how to rub a pencil or crayon sideways on a piece of paper covering a textured surface. See if she can recognize a pattern on the paper. With your child, cut out pictures of patterns from magazines. Help her glue the pictures onto small index cards. Punch a hole in the top, left-hand corner of each card. Use a large loose-leaf ring to hold the cards together to make a pattern book. Give your child kitchen objects that create a pattern (e.g., colander, fork, strainer, potato masher) to use in a sandbox or tub of sand. Help your child create a pattern-matching game. Cut a variety of fabric swatches or gift-wrap paper into 2-inch squares. Cut several squares from each different pattern. Help her glue one square of each pattern inside the lid of a shoe box. Take turns selecting squares and matching them to the ones glued in the lid. Once the game is over, your child can store the squares inside the box.

Look for your child to ...	Your child may ...
Duplicate and extend patterns.	Imitate a pattern of sounds and physical movements (e.g., clap, stomp, clap, stomp ...). Continue rhythmic patterns. Complete the patterns in a story (e.g., Brown Bear, Brown Bear, what do you see?).

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Look for your child to ...	Your child may ...
Duplicate and extend patterns. *(continued)*	Repeat a pattern according to size, color and shape while stringing beads. Predict what comes next when an adult "reads" the pattern using simple vocabulary (e.g., car, car, boat, car, car, ___). **You can support your child ...** Make patterns with your child by arranging goldfish crackers on a paper towel (e.g., arrange them tail up, down, up, down or up, up, down, up, up, down). See if she can add to the pattern or create her own. With your child, cut clay or Play-Doh into various shapes using cookie cutters. Lay the "cookies" out in a pattern (e.g., star, heart, circle, star, heart, circle). Have her make the same pattern, then extend it. Create a pattern by lining up two different kinds of dried pasta on a piece of paper (e.g., macaroni, spaghetti, macaroni, spaghetti, etc.). Have your child try to make the same pattern. Let her create a pattern for you to copy. As she becomes more experienced, increase the number of types of pasta. Do a clap and tap rhythm pattern for your child to copy (e.g., clap your hands twice, then your knees twice, then repeat). As her ability to copy improves, create more complicated patterns. Let her create a pattern for you to follow. Take turns creating rhythm patterns with your child. On a piece of paper, draw a simple pattern using dots and dashes (e.g., . . – – . . – –). Have your child look at the pattern and try to draw it.

Look for your child to ...	Your child may ...
Create patterns.	Create simple patterns with beads or blocks according to color, size or shape. Create simple patterns on paper when drawing, coloring or painting. **You can support your child ...** Play pattern games with your child (e.g., give your child green and red grapes and have her arrange them in patterns such as red, green, red, green or red, red, green, red, red, green). Provide an assortment of beads for your child to use to make patterns. Give your child a small bowl of raisins, pretzels and snack crackers. See if she can use them to create a pattern. Give your child a variety of applicators (e.g., sponges, brushes of various widths and feathers) to use when painting. Encourage her to create patterns using different applicators and strokes.

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Pre-K Mathematics Standards (Goals): Measurement

Young children naturally compare volume, length and other attributes in their play and daily lives. When your child explores how much water a cup holds or how long a line he can make with his cars, he is beginning to understand measurement.

Compare: think about same and different; describe the relationship between two or more objects

Measurable features: a characteristic or attribute of an object that can be represented with a number, such as size, shape, weight or number of sides

Sequence: the arrangement of events or actions in a progressive order over time

Standard (Goal):

Makes comparisons.

Look for your child to ...	Your child may ...
Compare objects using measurable features.	Use words to describe opposites (e.g., big/little, long/short, heavy/light). Choose the largest snack. Say, "My bucket is heavier." Say, "This crayon is shorter." **You can support your child ...** Give your child two items of the same type (e.g., pencils of different lengths or buttons of different sizes). Have your child compare the objects and decide which one of each type is bigger, smaller, longer or shorter. Ask your child questions that encourage him to compare (e.g., ask, "Whose shoes are bigger, yours or Daddy's?" or "Whose cup has more milk, mine or yours?").

Look for your child to ...	You can support your child ...
Compare objects using measurable features. *(continued)*	Put a string in a plastic bag. Ask your child if he thinks the string is longer than he is. Have him pull the string out of the bag. Hold it up next to him, and see if the child guessed correctly. Use the string to compare other objects. Is it longer or shorter than a bed? Is it longer or shorter than the distance from the tub to the sink? Go outside with your child on a sunny day. With chalk, draw an outline of your child's shadow on a sidewalk or driveway. If he can, have your child draw an outline of your shadow. Ask him whose shadow is longer. Go back outside several hours later and repeat the activity. Are the shadows longer or shorter than they were before? Have your child roll a number cube and build a tower using the same number of blocks as the number shown on the cube. Then you take a turn. Whose tower is bigger? Measure your child's height, and mark it on a wall. Add a mark next to it showing his height at birth. Ask him which is taller. If you have a copy of his footprints from when he was born, have him step onto one barefoot to see how much bigger his foot is now.

Look for your child to ...	Your child may ...
Describe measurement.	Talk about an object being longer than another object. Use a variety of language to describe measurement (e.g., shorter, taller, wider, bigger, heavier, lighter, holds more, hot, cold).

You can support your child ...

Collect several objects that could be classified as heavy or light (e.g., a feather, ribbon, pencil, soup can, paperweight). Cut a fist-sized hole in the top of a box. Put the objects in the box. With your child, take turns reaching through the hole, feeling the objects and telling whether they are heavy or light.

Discuss the weights of various foods as you are preparing meals or putting away groceries (e.g., say, "This watermelon is heavy," or "This plate of cookies is light enough for you to carry.").

Provide a variety of belts for your child to sort into two groups: wide or narrow.

Provide paintbrushes of various widths. Have your child paint wide and narrow strokes on paper and talk about how they are different.

Talk about measurement terms in your everyday interactions with your child (e.g., say, "This ribbon is too short to go around the gift for Aunt Jennifer. Let's cut a longer ribbon.").

Look for your child to ...	Your child may ...
Order three or more objects according to length or size differences.	Place ribbons in order by length. Put cars in a row according to size. Put pans (or measuring cups) inside each other.

You can support your child ...

Compare numbers of everyday objects with your child (e.g., ask, "Are there more trees in our yard or in Maya's yard? Are there more shirts or shorts in the drawer? More cups or glasses on the shelf?").

Use props from books. When you read a book to your child, provide some of the objects in the book for him to sort. For example, read or tell the story *Goldilocks and the Three Bears* and get out three bowls of different sizes. Have your child show you which bowl is for Papa Bear, Mama Bear and Baby Bear.

Put a variety of objects that are significantly different in length (e.g., ribbons, ropes, yarn, chains, tubes and pencils) into a cardboard box. Have your child sort the objects. If he does not sort them by length on his own, suggest he put the objects into two groups: long and short.

Play a game of pretend post office with your child. In your jobs as postal workers, sort envelopes, boxes and tubes by shape. Organize them by size. Use words such as biggest, smallest, longest and heaviest.

Give your child a collection of objects that are alike except for size (e.g., pencils of various lengths, drinking straws or pipe cleaners cut into different lengths, or small rocks or shells. Take turns arranging the objects by size. Often children will begin by finding the largest and the smallest, then comparing the others by pairs.

Tell your child to find the smallest item, then the biggest, in a group of five toy cars, potatoes, shells, etc. Compare the ones in between.

Look for your child to ...	Your child may ...
Use language associated with time in everyday situations.	Say, "Snack time comes after rest time." Say, "It's nighttime because it is dark." Say, "I eat breakfast in the morning." Say, "My birthday comes in the summer."

You can support your child ...

Help your child cut out a person from a catalog or magazine. Help him cut out clothing that is about the same size as the person. Ask him to put some clothes on the figure that could be worn in summer, then put clothes on the figure that could be worn in winter.

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Look for your child to ...	You can support your child ...
Use language associated with time in everyday situations. *(continued)*	Ask questions about time as you read books to your child (e.g., ask, "Is it morning or night in this picture? How can you tell?" or "Is it winter or spring? How can you tell?"). Use time words with your child (e.g., say, "After we read a book, it will be time for bed," or "In three days we will go to Grandma's house. Let's write it on the calendar so we'll know the day we're going."). Count aloud as your child gets undressed or puts a toy away to help him understand the concept of how long things take. Talk about how long things take to cook (e.g., say, "We'll cook the popcorn in the microwave for three minutes, and it will be finished.")

Look for your child to ...	Your child may ...
Anticipate, remember and predict a sequence of events.	Say, "I brush my teeth before I go to bed." Say, "We went to the library and then the grocery store." Recall recent past events and talk about them (e.g., say, "Yesterday we went to the zoo."). Describe the sequence of activities when going to the grocery store. Tell a story such as *The Three Little Pigs* or *Goldilocks and the Three Bears* with the correct order of events. Point out when a familiar story is not told in the correct order.

You can support your child ...

Talk about the order of activities you have planned for the day (e.g., say, "First we'll go to the bank, then the park, then the grocery store.").

Lay out several photographs of your child from birth to the present. Arrange the pictures in chronological order, and explain how he has changed. Mix up the photos and see if he can arrange them in order.

Cut out a simple comic strip from a newspaper and read it to your child. Then cut the strip into separate panels and mix up the panels. Ask your child if he can put them in order.

Help your child follow a simple recipe (e.g., make a peanut butter and jelly sandwich). Talk about what to do first, second, third, etc.

Take five index cards. On each card, draw a step involved in making a snowman (e.g., 1) snow on the ground, 2) one large snowball, 3) two snowballs stacked on top of each other, 3) three stacked snowballs, 4) three stacked snowballs with stick arms, 5) completed snowman with eyes, nose, hat). Have your child line the cards up in sequence, and talk with him about what comes first, second, third, etc.

Pre-K Mathematics Standards (Goals): Measurement

Standard (Goal):

Uses measurement.

Look for your child to ...	Your child may ...
Explore ways to measure.	Fill a container with solids or liquid (e.g., sand, ice cubes, water). Pour liquid from one container to another. See how many blocks it takes to cover a sheet of paper.

You can support your child ...

Provide containers of different sizes for your child to use with sand, sugar, dried pasta or water. As she plays, talk about full, empty, half-full. Help her count how many of each smaller container of sand or water it takes to fill a larger one.

Give your child many opportunities to explore measuring tools (e.g., rulers, yardsticks, measuring cups and spoons, tape measures, scales) and to see them being used.

Provide funnels, turkey basters, measuring spoons and cups for your child to play with in the sink or bathtub.

Help your child figure out how long a piece of paper is using toy cars, paper clips or hair barrettes to measure.

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Look for your child to ...	Your child may ...
Measure using objects.	Place a string next to an object to measure length. Use a toy thermometer to measure the "patient's" temperature. Imitate using a ruler when helping dad.

You can support your child ...

In a bathtub or sink, hold up a large container, and give your child a small cup. Have her guess how many times she would have to pour water from the cup to fill the large container. Help her count how many times it takes, and see how close she came with her guess.

Have your child use her little finger as a measurement tool. Tell her to find as many things in your home or yard as she can that are smaller than her "pinky" finger.

Make a simple scale by attaching a paper cup to each end of a wire coat hanger. Hang the "scale" on a doorknob. Have your child weigh items that will fit into the cups to determine which ones are heavier.

Have your child compare the weights of canned goods and boxes on your kitchen shelves. Tell her to hold one item in each hand and decide which is lighter and which is heavier.

Talk about measurement as you use it in daily life (e.g., say, "Let's hang this picture 6 inches above the bookshelf in your room."). Show your child how you use a ruler to measure.

Show your child how to weigh produce in the scale at the grocery store. Talk about adding items or taking them off to reach the desired amount.

Collect shoe boxes. Play shoe store with your child. Take turns measuring each other's feet and matching them to the right size shoe.

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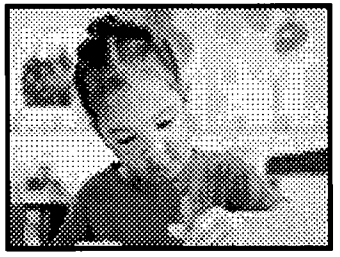
Pre-K Mathematics Standards (Goals): Exploring Data

Young children explore data by informally collecting, organizing, representing and comparing information gathered during play and in daily life. When your child asks questions to find out information, he is exploring data. When he collects rocks or leaves and sorts them, he is exploring data.

Classify: sort or form groups by similar characteristics

Data: information gathered to answer a question

Organize: arrange information in order to see relationships, often using graphs and charts



Standard (Goal):

Collects, organizes and uses information.

Look for your child to ...	Your child may ...
Ask questions to gather information.	Ask, "What is your favorite color?" Ask, "What month is your birthday?" Ask, "What do you like to play outside?" Ask, "How many brothers and sisters do you have?"

You can support your child ...

Ask your child data-related questions about himself (e.g., "Do you have more cars or more trucks?" or "Would you rather play outside when it's hot or when it's cold?").

Play news reporter with your child. Encourage him to ask you questions as a reporter does on television. Switch roles and ask him questions.

Go for a rock-collecting walk. Have your child collect all the rocks he likes, then have him sort them. Ask, "How many smooth rocks are there? How many rough ones? Which group has more?"

Make "I wonder" statements to your child (e.g., say, "I wonder how many families on our street have pets? Are there more cats or dogs?").

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Look for your child to ...	Your child may ...
Sort and classify objects into groups and sometimes explain how the grouping was done.	Put objects together that have the same use (e.g., blocks, dishes, vehicles, clothes). Explain how the buttons were sorted (e.g., say, "I put the red buttons together.").

You can support your child ...

Encourage your child to develop collections of things that interest him. Collections provide children with many opportunities to sort and re-sort.

Look through magazines and catalogs to find pictures of familiar containers (e.g., a purse, refrigerator, cabinet, backpack, diaper bag, car or house) that could hold other items. Cut the pictures out and glue them to index cards. With your child, take turns picking a card and naming something commonly found in the object shown.

Help your child arrange his books by category (e.g., animal, rhymes, counting, funny, feelings, etc.).

Show your child several objects that are the same and one that is different (e.g., three socks and a ball, three toy cars and a pencil, or three spoons and a fork). Ask him which object does not belong and why. Take turns playing the game.

Provide collections of objects for your child to sort, such as beads, buttons, coins, nuts and bolts, pieces of colored paper, costume jewelry, stickers, bottle tops or golf tees. Have your child sort them in various ways, letting him choose how. Ask, "Why did you put those together?"

Play a game of "I Spy" with your child. Choose a category such as "I spy with my little eye something we use to draw with." Have him find as many drawing tools as he can. Take turns finding objects and thinking of categories.

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Look for your child to ...	Your child may ...
Evaluate information to answer questions.	Say, "Two kids have birthdays in July." Say, "I have five trucks and four cars." Say, "More buttons are red."

You can support your child ...

Play tic-tac-toe with your child and keep score by using tally marks to record the winner of each game. After several games, ask him which of you has the most marks.

Talk about the weather and why people wear certain clothes depending on the temperature. Help your child select clothing for himself or his stuffed animals according to the weather.

Talk to your child about the likelihood of something happening (e.g., say, "I hear thunder. Do you think it might rain?").

Have your child ask each member of your extended family the month in which he or she was born. Help him put a sticker on a calendar at the top of each month named. See if he can tell you which month has the most birthdays and which has the least.

Help your child create a graph. Divide a piece of paper into four columns. Use markers to color a large dot at the top of each column – one red, one blue, one green and one yellow. Divide the columns into equal sections to form a graph. Have your child ask family members, relatives and friends which of the colors they like best. Tell him to put a mark in the correct column for each response. Ask your child to decide which color most people liked best.

Tips for Parents

You play a large role in your child's mathematical development. These suggestions can help you guide her growth.

- When you read to your child, frequently include books that present math concepts such as counting, identifying shapes, measuring and comparing.
- Sing songs that have numbers in them at bedtime, around the house, on walks and on car rides.
- Play board games that encourage counting spaces, matching shapes, counting dots on dice, or other math-related activities.
- Do finger plays with your child that involve numbers.
- Use "math talk" with your child. For example, say things such as bigger, smallest, curved, angles, heavy, ball-shaped, square, many, less, same and different.
- Count aloud as you go about your day — count plates as you set the table, cans of water as you make juice, quarters as you put them in the parking meter.
- Remember that children learn about number first by exploring objects. After they understand the concept of three objects, for example, they can begin to grasp the idea of a picture of three things. The last step is identifying and understanding the numeral "3."
- Encourage your child to make collections. Resist the urge to throw out his "old junk." Collections provide natural opportunities to notice likenesses and differences and to compare objects and sort them into groups.
- Have your child help you with household tasks. He can help sort laundry, count out plates when setting the table, sort silverware and put it away, and measure ingredients for recipes.
- Point out and read numerals to your child that you use in daily life (e.g., say "The big hand is on the 2, and the little hand is on the 6." "Help me call Grandma. Her phone number is … ." "We are reading page 7." "Let's watch Channel 9." "Your temperature is 98.6.").
- Play games of make-believe that involve math ideas. For example, playing store involves counting items and money. Playing doctor's office or clinic encourages taking temperatures and measuring height and weight. Playing post office provides opportunities to organize envelopes, boxes and tubes by size.
- Provide toys that encourage your child to explore math ideas: blocks, puzzles, dominoes, pegboards, board games, sandboxes and playground equipment.

- Talk with your child about how you use math in everyday life. When you measure ingredients for a recipe, weigh produce at the market, read a map, compare prices, look up a phone number, or address an envelope, talk about what you are doing.
- Remember that we learn more from our mistakes than our successes. You want your child to feel confident about using math to solve problems. Allow him to explore concepts and ask questions without fear of being criticized.

Resources – Books

Copley, J., editor. (1999). *Mathematics in the early years.* Reston, VA: The National Council of Teachers of Mathematics Inc.

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Fromboluti, C.S., & Rinck, N. (1999). *Early childhood: Where learning begins — mathematics.* Jessup, MD: U.S. Department of Education.

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Kamii, C. (1982). *Number in preschool and kindergarten.* Washington, DC: National Association for the Education of Young Children.

Meisels, S.J., Marsden, D.B., & Stetson, C. (2000). *Winning ways to learn.* New York: Goddard Press.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reston, VA: National Council of Teachers of Mathematics.

Smith, S.S. (2001). *Early childhood mathematics.* Needham Heights, MA: Allyn & Bacon.

Waite-Stupiansky, S., Church, E.B., Feeney, L., Karnes, M., Katz, L.G., & Ward, C. (1992). *Learning through play: Math, a practical guide for teaching young children.* New York: Scholastic.

Wolf, D.P., & Neugebauer, B., editors. (1996). *More than numbers: Mathematical thinking in the early years.* Redmond, WA: Child Care Information Exchange.

Resources for Children

Number and Operation: *Ten, Nine, Eight* — Molly Garrett Bang; *Let's Count It Out* — Nancy White Carlstrom and Bruce Degen; *How Many Bugs in a Box?: A Pop-Up Counting Book* — David A. Carter; *Five Little Monkeys Jumping on the Bed* — Eileen Christelow; *Turtle Splash: Countdown at the Pond* — Cathryn Falwell; *Millions of Cats* — Wanda Gag; *The Doorbell Rang* — Pat Hutchins; *Five Creatures* — Emily Jenkins; *Splash* — Ann Jonas; *Jelly Beans for Sale* — Bruce McMillan; *Zin! Zin! Zin! A Violin* — Lloyd Moss and Marjorie Priceman; *The Penny Pot: Counting Coins* — Stuart J. Murphy and Lynne Woodcock Cravath; *Spunky Monkeys on Parade* — Stuart J. Murphy and Lynne Woodcock Cravath; *Give Me Half!* — Stuart J. Murphy and G. Brian Karas; *Elevator Magic* — Stuart J. Murphy, G. Brian Karas and Frank Remkiewicz; *Parts* — Shelley Rotner; *The Relatives Came* — Cynthia Rylant and Stephen Gammell; *The Right Number of Elephants* — Jeff Sheppard; *Seven Blind Mice* — Ed Young.

Geometry and Spatial Sense: *Shape Up* — David A. Adler and Nancy Tobin; *The Secret Birthday Message* — Eric Carle; *The Shape of Things* — Dayle Ann Dodds and Julie Lacome; *A Wing on a Flea: A Book About Shapes* — Ed Emberley; *Picture Pie: A Circle Drawing Book* — Ed Emberley; *Picture Pie 2: A Drawing Book and Stencil* — Ed Emberley; *My Shapes/Mis Formas* — Rebecca Emberley; *In the Driver's Seat* — Max Haynes; *Shapes, Shapes, Shapes* — Tana Hoban; *Round and Square: A Through the Window Book of Shapes* — Janie Louise Hunt; *Shapes for Lunch!* — Melinda Lily and Charles Reasoner; *Shapes (Slide 'N' Seek)* — Chuck Murphy; *The Art of Shapes: For Children and Adults* — Margaret Steele and Cindy Estes; *Round Is a Mooncake: A Book of Shapes* — Roseanne Thong and Grace Lin.

Patterns and Relationships: *The Three Bears* — Paul Caldone; *The Quilt* — Ann Jonas; *Too Big, Too Small, Just Right* — Frances Minters and Janie Bynum; *Henry the Fourth* — Stuart J. Murphy, Scott Nash and Scott Murphy; *Just Enough Carrots* — Stuart J. Murphy and Frank Remkiewicz; *The Best Bug Parade* — Stuart J. Murphy and Holly Keller; *The Bag I'm Taking to Grandma's* — Shirley Neitzel and Nancy Winslow Parker; *The Jacket I Wear in the Snow* — Shirley Neitzel and Nancy Winslow Parker; *The Napping House* — Audrey Wood and Don Wood.

Measurement: *Who Sank the Boat?* — Pamela Allen; *Brown Rabbit's Day* — Alan Baker; *My Measuring Cup* — Joanne Barkan and Judy Wheeler; *A Cake for Me* — Karen Magnuson Beil and Paul Meisel; *Telling Time and Big Mama Cat* — Dan Harper, Barry Moser and Cara Moser; *Inch By Inch* — Leo Lionni; *My First Book of Time* — Clare Llewellyn; *Guess How Much I Love You* — Sam McBratney and Anita Jeram; *No I'm Big* — Margaret Miller; *How Big Is a Foot?* — Rolf Myller and Susan McCrath; *Just a Little Bit* — Ann Tompert and Lynn Munsinger.

Exploring Data: *Gray Rabbit's Odd One Out* — Alan Baker; *The Important Book* — Margaret Wise Brown and Leonard Weisgard; *Kente Colors* — Deborah M. Newton Chocolate et al.; *Is It Red? Is It Yellow? Is It Blue?* — Tana Hoban; *Brown Bear, Brown Bear, What Do You See?* — Bill Martin Jr.; *Beep-Beep, Vroom Vroom!* — Stuart J. Murphy and Chris L. Demarest; *A Pair of Socks* — Stuart J. Murphy and Lois Ehlert; *Probably Pistachio* — Stuart J. Murphy and Marsha Winborn; *Sorting* — Henry Pluckrose; *The Button Box* — Margarette S. Reid and Sarah Chamberlain; *Grover and the Everything in the Whole Wide World Museum* — Norman Stiles, Daniel Wilcox, Joe Mathieu, Joseph Mathieu and Jon Stone.

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Missouri Department of Elementary and Secondary Education
Early Childhood Section
P.O. Box 480, Jefferson City, MO 65102-0480
Web site: dese.mo.gov

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