Introduction for Parents

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.

I. 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 (cardinality): 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: matching objects from one set to objects of an equal set

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)

Tagging: linking a single number name with one object, and only one, at a time

I. Number and Operations

1. Uses number to show quantity.

Look for your child to ...	Your child may ...
a. 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.
Look for your child to ...	**Your child may ...**
b. 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 ...**
c. 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.").

I. Number and Operations

2. Uses language to represent number of objects.

Look for your child to ...	Your child may ... / You can support your child ...
a. Use language to compare number (e.g., more/ less, greater/ fewer, equal to).	**Your child may ...** 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.
b. Combine and name how many.	**Your child may ...** Put the red, yellow and blue crayons together and tell how many total 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?" 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.
c. 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.

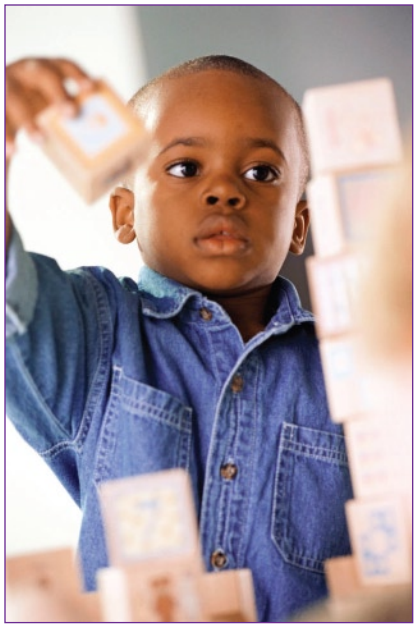
Look for your child to ...	Your child may ...
d. Explore everyday fractions.	Say, "I have a whole orange," or "I have half an apple," although not always accurate.
	You can support your child ...
	Give your child a wide variety of measuring cups and spoons and let him explore them with water and dry 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 dough pies into pieces to share equally among his "customers."

I. Number and Operations

3. Solves problems using number.

Look for your child to ...	Your child may ...
a. Name how many are in a group (up to five objects).	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. Count five blocks and say, "There are five blocks."
	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 ...**
b. Use one-to-one correspondence when counting objects.	Get a carton of milk for each child at the table. Put a cup with each napkin when setting the table. When playing, match one car to each block or give one plate to each doll.
	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. 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 ...
c. 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?"
Look for your child to ...	**Your child may ...**
d. 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 cookies 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? 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.



I. Number and Operations

4. Uses numerical representation.

Look for your child to ...	Your child may ... / You can support your child ...
a. Use drawings to represent number.	**Your child may ...** 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.").
b. 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. 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.
c. 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 ...	Your child may ...
d. Write some numerals.	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. 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 ...**
e. Match numeral with quantity.	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.

II. 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

1. Investigates positions and locations.

Look for your child to ...	**Your child may ...**
a. Take objects apart and put them together.	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. 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 dough 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 ...**
b. 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."
	You can support your child ...
	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. 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 ...
c. 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.
	You can support your child ...
	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.

II. Geometry and Spatial Sense

2. Explores shapes in the environment.

Look for your child to ...	Your child may ...
a. Investigate and talk about the characteristics of shapes.	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.
Look for your child to ...	**Your child may ...**
b. Create and duplicate 2- and 3-dimensional shapes using a variety of materials.	Use blocks to make other shapes or objects. Make shapes with clay or play dough, 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. 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 dough, 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.

Look for your child to ...	Your child may ...
c. Identify and name some shapes.	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. 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 say ...**
d. Indicate if shapes are alike or different using one or more characteristic.	*Three-dimensional shapes* "A bubble and an orange are both like balls (spheres)." "A block (cube) is shaped like a box." "This ball rolls, but this block does not." *Two-dimensional shapes* "A triangle has three sides," or "A square has four sides." "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 dough. 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.

III. 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

1. Recognizes relationships in the environment.

Look for your child to ...	**Your child may ...**
a. 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. 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 ...**
b. 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 dough. 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.

III.Patterns and Relationships (Algebra)

2. Uses patterns in the environment.

Look for your child to ...	Your child may ... / You can support your child ...
a. Recognize patterns.	**Your child may ...** 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.
b. Duplicate and extend patterns.	**Your child may ...** Repeat a pattern according to size, color or shape while stringing beads. Predict what comes next when an adult "reads" the pattern using simple vocabulary (e.g., car, car, boat, car, car, ___). 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?). **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 dough 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.
c. Create patterns.	**Your child may ...** 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.

IV. 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

1. Makes comparisons.

Look for your child to ...	**Your child may ...**
a. 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?"). 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. Compare child's length at birth to now. 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 ...**
b. 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 ...
c. 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 say ...**
d. Use language associated with time in everyday situations.	"Snack time comes after rest time." "It's nighttime because it is dark." "I eat breakfast in the morning." "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. 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 ...
e. 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.

IV. Measurement

2. Uses measurement.

Look for your child to ...	Your child may ...
a. 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.
Look for your child to ...	**Your child may ...**
b. 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.

V. Exploring Data (Probability)

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

1. Collects, organizes and displays information (Charting and Graphing).

Look for your child to ...	**Your child may ask ...**
a. Ask questions to gather information.	"What is your favorite color?" "What month is your birthday?" "What do you like to play outside?" "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?").
Look for your child to ...	**Your child may ...**
b. Sort and classify objects into groups.	Put objects together that have the same use (e.g., blocks, dishes, vehicles, clothes). Group objects by their height, size, color or shape.
	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.). 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.
Look for your child to ...	**Your child may ...**
c. Explain how groupings are done.	Tell how the buttons were sorted. ''I put the red buttons together.'' Tell why he put the red cars in a group and the blue cars in a group.
	You can support your child ...
	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?"

Look for your child to ...	Your child may say ...
d. Uses charts and graphs to evaluate information.	After looking at the chart, "Two kids have birthdays in July." "I have five trucks and four cars." After looking at the graph, "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. 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.

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Books 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.

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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.