




4. Children need to have experiences that allow them to move themselves and objects so they can develop spatial sense. Activities, such as climbing and block play, help children conceptualize relationships of objects such as position (over, under) and direction (left, down).

 **E. Language development in relation to shapes and space.** Use the handout, *Helping Your Child Learn about Shapes and Space*, to discuss shapes. (Refer to the resource, *Early Stages of Math Development: Shapes and Space*.)

1. Children need to learn mathematical words to help organize their thinking about shape, position, and direction.
2. Parents can use position words often (top, bottom, over, under, beside, through, up, down, above, below, right, left) during daily routines to help her understand their meanings. Some words, especially *right* and *left*, take a lot of exposure to comprehend.
3. Children use language to describe shapes (*flat*, *curved*, *ball-shaped* [sphere], *can-shaped* [cylinder], *box* [cube]). This descriptive language is an important part of shape identification.
4. Parents can ask questions that encourage children to talk about shapes and positions (How is that shape like this one? How is it different? What if I turn this shape? and Where have you seen this shape before?)


**F. Parenting topic.** Choose a topic from the Parenting Topics section of the guide based on the family's needs, interests, and goals. Refer to the resource box at the beginning of the plan for possible parenting topics to consider. Use the parent handout to discuss the topic. Include the child in the discussion as much as possible.

#### IV. Parent-child activity: Shapes and Space

**A. Rationale.** Tell the parents why this activity is important.

1. Holding and manipulating three-dimensional shapes helps a child learn their properties and how to identify similarities and differences.
2. Moving objects in space helps a child to see where things are in relation to other things.
3. Because the dendrites in the brains of preschoolers are growing rapidly and excess synaptic connections are being pruned, it's important that children this age have varied and repeated experiences with shapes and spatial sense to form and keep the pathways that will support later math skills.

#### B. Shapes and Space

-  1. Activity description. Use the handout, *Shapes and Space Activity Page*, to share the directions with the parents.
- a. While playing the games, *Does It Roll?* and *Does It Stack?*, the parent and the child will explore familiar items of different shapes to learn more about their physical characteristics.
2. Activity set up. Involve the child and parents as much as possible.
- a. Show the parent the items you have brought and ask him if he would like to add any objects from his home.
  - b. Spread the objects out on the floor or table.
3. Steps to facilitate
- a. Encourage the parent and child to explore the objects before beginning a game.
  - b. Introduce the game *Does It Roll?* Have the parent and child select objects and try to roll them a short distance along a flat surface. Encourage them to make two piles—objects that roll and those that don't.
  - c. Then play *Does It Stack?* by identifying which items will stack on top of each other and which will not. Invite the parent and child to create a new game that helps them learn more about the shapes.
  - d. Continue to explore the similarities and differences in shapes. Have the parent and child use the washable markers to trace around each object onto the paper. Then play a matching game with the

three-dimensional objects and the two-dimensional tracings.

4. Strategies for supporting learning
  - a. While the child is playing with the objects, encourage the parent to describe the objects using words such as *round*, *straight*, *curved*, or *flat*.
  - b. Allow the child to take the lead in play. She will let you and the parent know when she is ready to move to the next part of the activity.
  - c. Invite the child to share with you and the parent about what she is doing.
  - d. Allow the child to make errors. Encourage the parent to model the appropriate response rather than correct his child.
  - e. Model and encourage the parent to use open-ended questions to help the child organize and further her thinking. For example, “Why do you think it is not rolling straight?”

#### C. Book sharing/literacy experience

1. Give the book to the child and ask her to have the parent read it aloud.
2. Encourage the parent and child to find shapes in the illustrations.
3. If the child requests, have the parent re-read the book or give the book to the child to look at.
4. Go on a scavenger hunt and find the shapes in the book in the child’s home environment. Have the parents and child refer to the book as a resource.
5. If desired, give the parent a page to add to the child’s *Rhymes and Songs* book. Help the parent teach the rhyme or song to his child by repeating it several times.



#### D. Parent follow-up activity. Use the back of the *Shapes and Space Activity Page* to help the parent determine a follow-up activity. The following is a suggestion.

1. Take a walk around the home to find and name shapes in the environment. The child may want to hold an object of a certain shape and look for one that matches it.
2. Provide opportunities for the child to represent shapes and explore spatial relationships by drawing, building, and playing with puzzles.
3. Encourage play with big boxes or on playground equipment. Children learn about shapes and spatial relationships when they experience how they themselves fit in space as they go over, under, around, into, and through.

#### E. Optional/extended activity. Use this activity if time remains in the visit.

1. Introduce the sponges and stamp pad to the parent and child. Encourage them to select sponges and press them on the stamp pad and then onto the paper.
2. Ask the parent and child questions to get them to talk about the characteristics (straight, curved, flat, round, corners).
3. Ask the parent and child to name the two-dimensional shape that was created by the three-dimensional sponge. For example, a cone makes a triangle; a cube makes a square.



#### F. Shared observation. Help the parents observe their child’s play. Use the back of the *Shapes and Space Activity Page* to summarize parents’ observations.

1. In the area of intellectual development you and the parent may observe the child:
  - a. exploring the objects using all her senses. She may demonstrate that she is noticing differences and similarities by sorting or matching the objects. She may not be able to identify the shapes by name.
  - b. showing more of an awareness of spatial relationships by moving herself and objects over, under, around, and through things.
  - c. finding a geometric shape when asked, but she may not be able to name it. She may have rigid beliefs about shapes (will only recognize a triangle if it has three equal sides).
  - d. experimenting with rolling and stacking objects and sorting them by the results. She may try different ways to solve a problem or put a puzzle together.

- e. following the parent's directions to move an object in the environment or look for something by following directions (look under the bed and behind the box).
  - f. recognizing and identifying familiar geometric shapes in her environment, and understanding that there are many different forms of a specific shape. She will be able to match three-dimensional objects to two-dimensional shapes.
  - g. solving problems that deal with space such as fitting many blocks into a small container or putting puzzle pieces into a frame.
2. In the area of **language** development you and the parent may observe the child:
- a. following the directions for the rolling and stacking games. She will demonstrate an understanding of familiar characteristics (e.g., locating a *round* object).
  - b. saying and responding to frequently used position words such as *on* and *under*.
  - c. describing how things are alike and different as she plays and using geometric shape words for objects in the environment.
  - d. using terms such as *in front of* and *in back of* or using the terms *first* and *last* to give directions.
  - e. using words, such as *beside*, *between*, and *middle*, to describe more complex spatial relationships.
  - f. experimenting with new, big words and making new words by combining ones she already knows.
3. Some questions you may want to ask the parent:
- a. How did your child show her understanding of the similarities and differences in objects?
  - b. What describing words did your child use to show her understanding of shape?
  - c. How did your child show her understanding of position and direction?

## V. Summary

**A. Key observations.** Restate one or two key observations about the child's development.

**B. Parents' strength.** Point out strengths you have observed.

**C. Parent follow-up.** Remind parents to continue with the follow-up to the activity(ies) and tell them that you'll be eager to hear about their experiences.

1. Parent follow-up activity(ies) for the next visit.
2. Review any action steps related to referrals or community resources.
3. Remind parents of upcoming group meetings or community events.
4. Set the date for the next personal visit.



## Early Stages of Math Development: Shape and Space

Children learn about mathematics through their everyday activities. They learn when they play with objects and people, solve problems, and make observations in their surroundings. In early childhood, children need extensive experiences manipulating real objects to develop a sense of shape and space. These experiences will provide the foundation for the more formal study of math later, including geometry, which deals with solid shapes and their surfaces.

Young children generally learn about shapes through observation and handling of three-dimensional (3-D) objects. It is natural for them to explore and manipulate objects during play and other everyday activities. They learn that round objects roll, but cannot be stacked. They learn that flat objects do not roll, but can be stacked. When they put puzzles together, they notice the shapes of objects. When they nest containers, they discover those that are similar in shape and are graduated in size will fit inside each other. Children also learn about shapes when they construct them from playdough, pipe cleaners, or heavy string. Eventually, they learn that shapes have critical attributes. For instance, a cube *can* be blue or made of wood, but it *must* have 6 square sides, 12 edges and 8 corners.

In early childhood, children need extensive experiences manipulating real objects to develop a sense of shape and space.

### Developing spatial sense

Children develop spatial sense (an intuitive feel for one's surroundings and the objects in them), by experiences that focus on the direction, orientation, and perspectives of objects in space, the relative shape and sizes of figures and objects, and how a change in shape relates to a change in size. When children climb, swing, slide and run in playgrounds, or when they play with blocks and puzzles, they are developing spatial sense.

When parents use position words (in, on, over, under, top, bottom, through, up, down, etc) often to describe what children are doing during play, they help children to understand their meanings. Parents can say, "You put that block beside this one. You are crawling under the table." Children need to hear such descriptions often in order to learn position words.

Children need to hear such descriptions often in order to learn position words.

### Understanding two-dimensional shapes

Once children understand the differences and similarities among solid shapes and can match and sort them with some success, they can begin to understand two-dimensional (2-D) shapes (a ball shape is a circle, a cone is a triangle, etc.). They use familiar words to describe shapes (ball, box-shaped, etc.), but with the help of adults children eventually can learn the geometric terms of both 3-D and 2-D shapes: sphere (circle), cube (square), rectangular prism (rectangle), cone (triangle). The more children hear these terms at home the easier it will be for them to learn them.



Parents often instruct their children to copy and draw shapes. While important, this is a fine motor rather than a mathematical skill. Children should be familiar with both 3-D and 2-D shapes before they master drawing them. Parents of preschoolers should be made aware that the best way to help their children learn about shapes is by providing a variety of objects that are similar and different in shape. They also can point out shapes in the environment and talk about how they are alike and different. They can provide blocks in a variety of shapes and puzzles in places that are easily accessible to their children. They can make shapes with their children—first three-dimensional ones from playdough or pipe cleaners; then two-dimensional ones using crayons or fingerpaint. Children are naturally creative. They can find many ways to form shapes—even with their bodies!

## Learning through play

Children learn best about shapes and space when they are involved in enjoyable, hands-on activities. Activities that are helpful in learning early geometry (appropriate for preschoolers) include:

- Building structures with various types of blocks, Legos, or toothpicks and marshmallows
- Playing with toys that are made up of parts that can be combined into a whole (puzzles, dolls and doll clothes, paper dolls, models that come apart)
- Folding and cutting activities (such as making a snowflake)
- Completing obstacle courses (crawling under the table, through the box tunnel, over the cushion, etc.)
- Playing Simon Says and being asked to “put your hands on your hips, your hands above your head, your feet apart”
- Playing with nesting toys or boxes of graduated sizes
- Playing with sand and water
- Exploring indoor and outdoor environments to identify shapes and angles made by people and nature
- Creating shapes from playdough, cookie dough, pipe cleaners, heavy string, sponges, or their bodies
- Tracing shapes onto paper
- Reading maps
- Making graphs
- Playing tic-tac-toe and other games that use a grid system



## Parent Educator Role

### What to do

- Help parents understand that the best way to teach preschoolers about shapes and space (an important foundation for geometry) is to give them frequent opportunities to play with and create three-dimensional solid shapes, to see pictures of shapes, and to hear descriptions of shapes and position words.

### How to do it

- Bring in a variety of objects that represent shapes, and help parents and children find them in their homes. Bring blocks, Legos, puzzles, and pictures of shapes. Describe shapes (is flat, has corners, is curved) and positions (on, under, over, between, beside).

### **Strengthening Families™**

Programs that explain to parents the stages of math development and emphasize the parental role in helping children develop important early math concepts, such as shapes and space, strengthen parenting. Knowledge of parenting and child development is a protective factor in the prevention of child abuse and neglect.

*To learn more about the Strengthening Families™ initiative, visit [www.strengtheningfamilies.net](http://www.strengtheningfamilies.net)*

### **References**

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### **Resources**

- U.S. Department of Education, Office of Communications and Outreach. (2005). *Helping your child learn mathematics*. Washington, D.C.: Author





# Helping Your Child Learn About Shapes and Space

*Understanding shapes and developing spatial sense will help your child learn geometry when he gets older.*

**T**he experiences he has during these early years form important pathways in his brain. The more times these pathways are used the more efficient they become. Young children generally learn about shapes and space in a specific order. They learn by

- exploring and using solid (three-dimensional) shapes in play
- matching solid objects to pictorial (two-dimensional) shapes.
- identifying and naming pictorial shapes.

Math is learned in a sequence. If you miss a step, it becomes difficult to grasp later concepts in the sequence. Many parents start with the last step in the above sequence when they teach their children shapes. If your child has not had enough experience exploring solid shapes he may have trouble identifying and naming pictures of shapes in books. Even if he is able to memorize the names of shapes he may not have the understanding of them that will help him later in school.

## What you can do

You can help your child by providing solid objects that represent shapes. With a little creativity you can find objects around your house. Cans of food are cylinders, balls are spheres, party hats are cones, boxes or blocks are cubes or rectangular prisms. At first your child will use his own words to describe the shapes of objects (ball-shaped or round, box-shaped, ice cream cone-shaped), but if you use the correct geometric terms he will become familiar with them.

When your child explores solids during play and everyday activities he learns that round objects roll, that flat ones can be stacked, that nesting toys are similar in shape and are graduated in

size, and that puzzles consist of various shapes that fit together. When he creates shapes from play dough or pipe cleaners, he sees and feels their characteristics. Eventually he learns that shapes have specific necessary attributes. For instance, he learns that cones can vary in size, color, material, and weight, but they must have a circle on one end and a point on the other.

Another understanding your child will need for the study of math is spatial sense (a feel for his surroundings and the objects in them). Experiences that focus on direction, position, and relative shapes and sizes will help your child develop this sense. When he runs, climbs, swings, slides, plays with blocks, and puts puzzles together he is developing spatial sense. Using words to describe positions in space (for example, on, under, over, off, top, bottom, through, beside) of both your child and of objects he sees will help him understand their meanings. You can say, "You are on the slide. You put the doll under the blanket. I am standing beside the chair."

## Ready for pictures

Once your child is familiar with solid shapes and their characteristics, he is ready to learn pictorial shapes (for example, circle, triangle, square, rectangle, oval). To help him make the move from objects to pictures, you can give him opportunities to trace around the solid objects so he can see how they look on paper. An easy way to do this is to help your child make solid shapes from playdough, use a plastic knife to slice them in half, and then match them to corresponding pictures. Dipping three-dimensional objects into paint and making prints with them also helps children understand the connection between solid items and their pictorial representations.

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## GAMES TO PLAY

There are many fun ways to give your child opportunities to learn shapes and to develop spatial sense. Provide blocks and puzzles in a variety of shapes and store them where your child can easily get to them. Ask your child to find specific shapes in your home or outside. Talk with him about how the shapes are alike and different.

- Make common shapes with your child—first three-dimensional, then two-dimensional. There are many ways to make two-dimensional shapes, including play dough, cookie dough, sponges, wet sand, toothpicks and marshmallows, pipe cleaners, heavy string, and even your bodies. You and your child can make 2-dimensional shapes using crayons, finger paint, markers, chalk, and other drawing materials. Have your child describe the shapes he makes so he becomes familiar with terms such as round, flat, corners, curved, sides, and cone.
- Playing with toys that are made up of parts that can be combined into a whole is a good way to help children understand shapes and space. These include dolls with clothes, models that come apart, blocks, Legos, puzzles, and paper dolls with clothes. Folding and cutting activities, such as making a snowflake, are helpful. Other suggested toys include nesting cups or boxes, cups or pitchers for sand and water play, and games that use a grid system (such as tic-tac-toe).
- Play a game of Simon Says with your child. Give him instructions that involve positional words, such as “put your hands *on* your hips, *over* your head, *under* your chin.” Set up an obstacle course in which your child will crawl *under* a table, *over* a cushion, *through* a box. These activities help him develop spatial sense.
- Hold a stuffed bear or other animal over a basket and ask your child, “Where is the bear?” See if he can tell you it is over the basket. Move the bear to another position (for example, beside or next to the basket), and repeat the question. Continue the game, asking your child to describe the bear’s position in relation to the basket (for example, *in* the basket, *under* the basket, or climbing *up*, *down*, or *across* the basket). A variation of this game is to take turns with your child tossing a beanbag at a basket and describing where it lands.
- Put an object that represents a solid shape (for example, square block, cone-shaped party hat, small can, ball) into the toe of an athletic sock or paper bag. Have your child reach into the sock and guess the shape. Tell him to describe what the shape feels like before he looks at it. Let him choose a different shape to put in the sock for you to guess. Continue taking turns guessing and describing the shapes.
- With your child, make pipe cleaners into various shapes and use them to blow bubbles. What shapes are the bubbles? Your child will discover that the bubbles always turn out to be spheres, but will have fun trying.

# Intellectual Development



## YOUR CHILD – 4 YEARS

### Look for your child to

### Ways you can help

#### MATCHING, SORTING AND CLASSIFYING

Put things into groups according to shape, size, or length.

Help your child start collections: rocks, leaves, bottle caps, buttons. Talk about how he might organize them. Use comparing words: bigger, smaller, longer, shorter.

Find which thing or picture does not belong.

Set out four items—three that are similar/same, and one that is different. Try a knife, fork, spoon, and crayon.

Sort things or pictures into two groups, according to category.

At the grocery store, point out how things are organized: produce here, books and magazines there, frozen foods there.

At home, let him help you figure out where to put the things you bought. Talk about why they belong where he puts them.

Complete a 12- to 18-piece puzzle.

Buy a simple puzzle, or make one. Help your child choose a bright picture, glue it to a piece of cardboard, and cut it apart.

Pick out the *longest* item in a group.

Play a game of “drawing straws.” Cut a drinking straw into three pieces. Place them in your fist so they appear to be the same length. Each pick one and compare. Longest straw “wins.” Take turns.

Understand *more*, and be able to tell which of two groups has more.

Help your child sort a collection into two groups. Then suggest that he choose the group that has more, and you will use the group that has less.

#### CONCEPTS AND PATTERNS

Name 8 basic colors.

Help your child make a book of colors.

Name penny, nickel, quarter, and dime.

Use coins to make patterns. Name the coins as you or your child set up a pattern: penny, penny, nickel, penny, penny, nickel...

# Intellectual Development

**YOUR CHILD  
4 YEARS**

## Look for your child to

## Ways you can help

### CONCEPTS AND PATTERNS

Name days of the week, in order.

Make a weekly schedule together. Make seven boxes across the page, and label them with the days of the week. Let your child help you write or draw in routines and special plans for each day.

Copy and continue a simple pattern.

Use beads or blocks to make a pattern for your child to copy. Name the colors and shapes as you place them: blue square, red square, blue square, red square.

Play a percussion instrument to the beat of familiar songs or speech patterns.

With your child, beat a spoon on a pan, in time to the rhythm of a favorite song.

Understand today, yesterday, and tomorrow.

Spend some time each night talking with your child about things that happened yesterday, today, and what may happen tomorrow.

Connects time with routine

Give him the idea of what to expect at different times in his day (e.g., bedtime is at eight).

Shows right hand/foot, left hand/foot upon request

Sing and dance the *Hokey Pokey*.

### NUMBERS

Count 10 items out loud

Play board games in which you have to count the squares to move ahead.

Recognize and name the numerals 1 through 5.

Borrow counting books from the library. Help your child make one of his own.

### EXPLORE AND EXPERIMENT

Enjoy learning about objects and materials by experimenting with them.

Let your child mix water and other “ingredients” together. What dissolves? What sinks? What floats? Encourage his exploration by using words like *wonder, predict, find out, try, observe*.

# Intellectual Development

**YOUR CHILD  
4 YEARS**

## Look for your child to

## Ways you can help

### REPRESENT IDEAS

Begin to draw and build with an idea in mind.

Make drawing and building materials available for him to use in daily play. Ask him to tell you about his drawings and buildings. Write what he says on his drawings. Leave his buildings up when possible.

### ATTENTION SPAN

Keep his attention on something he chooses to do, unsupervised, for 10 minutes.

Give him uninterrupted time to play with open-ended materials that he enjoys: play dough, drawing materials, blocks, etc. Praise him for staying with the activity.

