Your child was born ready to learn math. As she explores her environment, plays with different objects, and moves her body in different ways, she is learning about shapes and developing a sense of her body in relation to objects and people around her—also known as spatial sense. An awareness of shapes and spatial sense will help your child get ready to learn about geometry. Geometry is the study of mathematics that involves shape, size, position, direction, and movement and describes and classifies the physical world that we live in. Learning about geometry will also help your child learn about numbers and measurement.

The following geometry topics are helpful for you to know as you support your child’s mathematical thinking and help prepare her for Kindergarten:

- **Shapes**: A shape is the form of an object and involves naming both two- and three-dimensional shapes. Two-dimensional shapes are objects such as squares, triangles and circles. Three-dimensional shapes are solid objects such as cubes, spheres and cylinders.

- **Spatial Sense**: A young child’s spatial sense is thinking about or visualizing objects in different positions and imagining their movement. It also involves the use of position, direction, and distance words (next to, on, between) and using simple maps to describe the environment or to locate people or objects in the environment as well as being able to picture objects mentally after seeing them.

- **Transformation**: Transformation is changing shapes by putting shapes together, taking shapes apart, and sliding, flipping, and turning shapes to fit together such as in solving a puzzle.

- **Symmetry**: Young children also begin to recognize and create shapes that have a line of symmetry—or a line that divides a shape or object into two parts that are mirror, or reversed, images of each other.

If you have “math anxiety” be assured that you don’t need to have all the answers. Just show a positive attitude towards math and how you use math in your everyday routines. This handout will give you simple and fun ways to help your child learn about shapes and develop spatial sense through books, songs, movement, play, and everyday conversations.

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### Developmental Milestones in Geometry: (Shapes)

The following charts outline the development of mathematical thinking that is needed to understand geometry. Your child is an individual and may reach these milestones before or later than his peers.

<table>
<thead>
<tr>
<th>Your Preschooler Can...</th>
<th>What You Can Do</th>
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<tbody>
<tr>
<td>Match 2-D shapes, first</td>
<td><strong>Talk about shapes and sizes</strong> in your preschooler’s environment. Point out different shapes and talk about the shapes special parts or attributes (sides, points, angles). For example, if you see a triangle-shaped sign you can say, “This sign is shaped like a triangle because it has 3 sides and 3 points/angles)” as you trace the sign with your finger. Play a “shape hunt” game by asking your child to find shapes in your home. Ask, “What do you see that is round like a circle?” Talk about how shapes are alike and different (“That’s right! Your marble is round like a circle. Does it have any sides like a square?”)</td>
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<td>with the same size and</td>
<td>• Provide a variety of examples of shapes. Your child needs to see an assortment of shapes in different sizes (triangles that are long, skinny, or fat) and turned in many directions. This will help her avoid narrow ideas about any type of shapes (a shape is only a triangle only if it look like an isosceles triangle). You can use foam sheets to make shapes of different sizes for your child to play with in the bathtub, or place a magnet strip on the back of each foam shape for him to play on a cookie sheet or on your refrigerator door. Encourage your child to match or sort shapes by kind or size (“Let’s find all the squares,” or “Let’s put the smallest shapes in this pile”).</td>
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<td>orientation, then with</td>
<td>• Explore shapes. Draw shapes in the air (make a big round circle). Draw shapes using sidewalk chalk and encourage your child to walk along the sides, jump inside, or stand on a corner. Make two sets of shapes out of foam sheets or cardboard. Put one set of the shapes in a bag. Hold up one shape and ask your child to put their hand in the bag and feel the shapes until she finds the match.</td>
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<tr>
<td>different sizes and</td>
<td>orientation.</td>
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<td>orientation.</td>
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<td>Recognize and name</td>
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<td>shapes such as</td>
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<td>circle, square,</td>
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<td>triangle, and</td>
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<td>rectangle.</td>
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<td>Recognize and name</td>
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<td>and angles or a</td>
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<td>triangle has</td>
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<td>three points.</td>
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<td>Your Preschooler Can...</td>
<td>What You Can Do</td>
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<tr>
<td>Explore and describe 3-D shapes by what they look like and what they can do (the marble is round like a ball. It rolls).</td>
<td><strong>Include 3-D shapes in your child’s play such as cubes, cones, spheres, and cylinders.</strong> Talk about how a can is shaped like a cylinder and a ball is shaped like a sphere. Use play dough or clay to encourage your child to copy you as you make spheres, cubes, and cylinders out of play dough. Make the shapes into different shapes (flatten your clay ball to make a circle).</td>
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<tr>
<td>Find shapes hidden in a picture or arrangement.</td>
<td><strong>Provide your child with “reusable” items to create 3-D art</strong> such as empty paper towel tubes, boxes of various sizes and shapes, straws, and cotton balls.</td>
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<tr>
<td>Combine shapes to form a picture.</td>
<td><strong>Encourage your child to combine shapes into pictures.</strong> Provide him with a variety of shapes such as pattern blocks and tangrams to combine to create a picture or design. Use stickers of different shapes or cut out your own shapes from thin cardboard or foam sheets for him to put together to make a picture. Also, use computer games that allow him to move shapes to form pictures or designs or search for shapes hidden in pictures. Online shapes games can be found at <a href="http://pbskids.org/games/shapes.html">http://pbskids.org/games/shapes.html</a></td>
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<tr>
<td>• Play with building toys. Provide your preschooler with toys that she can build with, take apart, and put back together again such as building blocks and models that come apart. To encourage her play with wooden blocks, add toys (plastic animals) and invite her to build a barn or corral for the animals.</td>
<td>• <strong>Encourage puzzles.</strong> Provide puzzles for your child to solve. Use words like, “turn, slide, or flip” as she works on putting her puzzle together. Make your own puzzles by using the front of a cereal box and cut into 3 to 8 pieces for your child to put back together again. For more ideas on how to make your own puzzles, visit: <a href="http://www.extension.iastate.edu/Publications/PM724.pdf">http://www.extension.iastate.edu/Publications/PM724.pdf</a></td>
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# Developmental Milestones in Geometry: (Spatial Sense)

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<tr>
<th>Your Preschooler Can...</th>
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<tr>
<td>Understand and use positional words such as over, under, above, on, beside, next to, in front, behind, in, inside, outside, between, top, down, up, bottom, front, back, near, far, left, and right.</td>
<td>• <strong>Use positional words</strong> with your preschooler to describe his toys (“Your car is on the table”) or ask him to follow simple directions (“Please put your cars in the basket”). Visit a park with a climbing structure to encourage him to move his body in different ways. Use a blanket to make a tunnel for him to crawl through.</td>
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<td>Use simple picture maps to locate where an object is. Make a simple map of a familiar place using toy objects in correct relative positions (e.g., for houses, cars, and trees)</td>
<td>• <strong>Make maps together.</strong> Draw a map of your backyard and use positional words to ask your child to find things (“What is beside the shed that is blue?”). Recreate a scene from your child’s favorite story by using your child’s toys. Ask your child open-ended questions such as, “How do the Billy Goats Gruff walk from their meadow to the other hillside?”</td>
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<tr>
<td>Duplicate a simple picture or block structure that he has seen or made.</td>
<td>• <strong>Recreate building structures.</strong> Encourage your preschooler to draw a picture of his block structure or take a picture of it to rebuild at a later time.</td>
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<tr>
<td>Create two-dimensional shapes and three-dimensional buildings that have symmetry.</td>
<td>• <strong>Play shape memory games.</strong> Draw a picture using 5 shapes (squares, circles, and triangles). Ask your child to look at your drawing. Hide the picture and then ask her to draw it from memory. Show your picture again and ask her to fix her picture if it does not match yours.</td>
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<tr>
<td>• <strong>Help your child explore the lines of symmetry</strong> by using mirrors in their block play, show how to fold and cut paper, and provide computer games that encourage him to complete the other “half” of a symmetric design.</td>
<td></td>
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How to Support Your Preschooler’s Early Geometry & Literacy Development

Children’s books and everyday activities allow you to teach your child about early math concepts along with building her early language and literacy development.

Read

You can use children's books to introduce your preschooler to both two- and three-dimensional shapes that are seen in everyday objects. You can also help her develop an understanding of spatial relations by using pictures in books to label positional words, body parts, and describe how book characters are moving in different positions in space.

Try These Activities:

• **Read books about shapes with your child.** Encourage him to find shapes in the pictures. Turn the book in different positions (sideways and upside) to show him the shape is the same no matter what position it is in.

• **Recreate a story scene** from your child’s favorite book or map by using her toys. Talk with her about what the story characters might see from different perspectives (“When Clifford gives Emily Elizabeth a ride, what would she see when she looks down?”)

• **Reenact favorite stories** with your child that use positional words such as “The Three Billy Goats Gruff” or “We’re Going On a Bear Hunt.” He can retell the story by either being a story character or using his toys for props. For printable story props to use with your child, visit: [http://www.kizclub.com/stories.htm](http://www.kizclub.com/stories.htm).

Books to Share with Your Preschooler:

The Wing on a Flea: A Book About Shapes by Ed Emberley  
Apollo by Caroline Gregoire  
Architecture Shapes by Michael J. Crosbie  
Bear in a Square by Stella Blackstone  
Cubes, Cones, Cylinders & Spheres by Tana Hoban  
Diary of a Worm by Doreen Cronin  
Dinosaur Roar by Paul and Henrietta Stickland  
Elephants Aloft by Kathi Appelt  
Grandfather Tang’s Story by Ann Tompert  
Inside Outside Upside Down by Stan and Jan Berenstain  
Over, Under and Through by Tana Hoban  
Round is a Mooncake: A Book of Shapes by Roseanne Thong  
Shapes, Shapes, Shapes by Tana Hoban  
The Greatest Gymnast of All by Stuart J. Murphy  
The Greedy Triangle by Marilyn Burns  
The Secret Birthday Message by Eric Carle  
The Shape of Things by Dayle Ann Dodds and Julie Lacome  
The Turn-Around, Upside-Down Alphabet Book by Lisa Campbell Ernst

Visit your local library for more children’s books about shapes and spatial sense.
Talk

Research shows that young children who have heard many different words and have a large vocabulary (knowing the names of things) find it easier to learn how to read and write. You can help build your child’s geometry and spatial vocabulary through everyday conversations and routines.

Try these activities:

Build your child’s shape vocabulary by identifying shapes using “looks like” terminology such as, “The triangle does look like a roof.” Also model three-dimensional names of shapes. If your child calls a sphere a ball, you can say, “Yes, it does look like a ball. I call it a sphere.”

Use position, movement, and distance words with your child. Examples of position words include in back of, next to/in between, inside/outside, near/nearer, and right/left. Movement words are around, through, sideways, away from, and straight/curved path. Distance words are near, far, far from, and high, higher, highest.

Problem-solve with your child about shapes. As your child builds with blocks, ask her what blocks would make the best tower and the specific shapes that do not work well and why. Ask open-ended questions to encourage her to describe shapes in her own words (“How is that shape like this one?” “What if I turn this shape? What would it look like?” “Where have you seen this shape before?”).

Write

The early literacy skill print awareness is a young child’s understanding that print (books, signs, written symbols) is meaningful and has many functions. Learning about shapes can help your child learn to recognize signs and form letters.

Try these activities:

• Modeling writing. The most important printed word for your child is his name. Write your child’s name in many places for him to see. Talk about how you use shapes to form letters in his name (“When I write the letter T for Tommy, I make a tall line down and a short line across at the top”).

• Provide a variety of materials for your child to form letters. Use snack food in different shapes to encourage your child to form letters, create new shapes, and spell her name. Sprinkle sand, sugar, or shaving cream on a cookie sheet for your child draw letters and shapes with her finger.

• Use alphabet books to point out how shapes are used to form letters (“The letter “O” looks like a circle”).
• **Create your own puzzles.** Use the front panel of your child’s favorite cereal box or birthday card to create a 3 to 8 piece puzzle.

• **Look up maps** online with your preschooler of favorite amusement parks. Talk about how to read the map or create your own map of familiar places with your child. Ask your child to tell you how to get to a certain place using her map (“How do we get to the mailbox from here?”).

• **Create a shape ramp.** Make a shape ramp out of cardboard or blocks. Ask your child to predict if different shaped blocks will roll or slide. Make a chart and test her predictions. Write down if she was right or wrong.

• **Create a book of objects and places from different views.** As you go for a walk, bring a digital camera. Take a picture of a stop sign from the front, side, underneath, and behind. Take a picture of your child’s favorite toy, person, or pet. Talk with him about what he sees that is the same or different from each angle.

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### Sing & Move

Through songs, rhymes, and movement games, you can help your child learn positional words and learn how to move her body in different ways to help build her spatial sense. These types of activities will also build her phonological awareness—a child’s ability to hear and play with the smaller sounds in words. Young children need to know the sounds in words before they can put the right sounds with printed letters to read.

**Try These Activities:**

• **Share movement games** with your child that encourage him to move his body in different ways (e.g., hands above your head). Also, provide your child with a scarf or tape a 12” streamer to a straw. Play lively music and ask your child to move the scarf in different positions (e.g., big/little circle, slow/fast in front of him, above his head, by his side, etc.).

• **Create your own shape game.** Tape paper shapes on your living room floor or draw shapes on paper plates and place around the floor. Play music and ask your child to walk around or dance by the shapes. When the music stops, she has to call out what shape she is standing by and then move to another shape just like it.

• **Share nursery rhymes** with your preschooler that encourage her to move her body and act out positional and directional words. Personalize the nursery rhymes by using your child’s name instead. For example, for the rhyme, “Jack be nimble,” say “Sally be nimble, Sally be quick. Sally jump over the candlestick.” Use everyday objects as props. Use a can for a pretend candlestick and encourage her to jump over it.
• **Share songs and fingerplays** that give directions for your child to follow and move his body in different ways. Create your own movements to favorite rhymes or songs to make positional words come alive! For more shapes songs, visit: [www.everythingpreschool.com/themes/shapes/songs.htm](http://www.everythingpreschool.com/themes/shapes/songs.htm)

**London Bridge**

London Bridge is falling down,
Falling down, falling down.
London Bridge is falling down.
My fair lady.

Take a key and lock her up,
Lock her up, lock her up.
Take a key and lock her up,
My fair lady.

**Furry, Furry Squirrel**

Furry, furry squirrel,
Hurry, hurry, hop.

Scurry up the tree trunk
To the very top.
When you reach the branches,
Hurry, turn around.
Furry, furry squirrel,
Scurry to the ground.

**Jump, Jump, Kangaroo Brown**

Jump, jump, Kangaroo Brown.
Jump, jump, up and down.
Jump, jump, Kangaroo Brown.
Jump, jump, all around.

**The Noble Duke of York**

Oh, the noble Duke of York,
He had ten thousand men.
He marched them up to the top of the hill
And he marched them down again.

Oh, when they’re up, they’re up
And when they’re down, they’re down.
And when they’re only halfway up,
They’re neither up nor down!

**Ring Around the Rosy**

Ring around the rosy,
Pocket full of posy,
Ashes, ashes
We all fall down.

Cows are in the meadow
Eating buttercups.
Ashes, ashes
We all stand up.

**Sources:**