Infants and Toddlers Learning About
Geometry and Spatial Sense

Beginning ideas about geometry and spatial sense develop as infants and toddlers explore and learn about the physical world.

Geometry for infants and toddlers involves learning about shapes and how shapes fit together and move in space (spatial relations). As infants explore and manipulate objects, they begin to learn about shapes. They learn that the shape of an object affects how it looks, how it feels, and what you can do with it. When a young infant holds and mouths a teething ring, she learns that it is round and smooth with no sharp corners and that it has a shape that is easy to grasp and hang on to. As infants get older, they explore shapes and spatial relations by putting objects together in different ways. They put objects in, next to, or on other objects, for example, by putting a spoon in a cup or one toy on top of another.

Infants and toddlers often learn concepts about spatial relations, such as location and direction, by using their whole bodies. They develop spatial sense as they reach, grasp, and move objects from place to place and as they learn to move their own bodies through their environment by rolling over, crawling, walking, dancing, and running. Older infants and toddlers also begin to understand and use words that describe the spatial concepts they are learning, such as “in,” “on,” “out,” and “under.”

Toddlers actively explore and learn about shapes and spatial relations as they try to figure out how things work. A toddler will work diligently at stacking graduated rings on a post, for example, or fitting an object into a shape sorter, trying out many possibilities until she succeeds. With hands-on experiences, older toddlers become more skilled at using the shapes of the objects they are playing with to plan and guide their actions. They can work simple puzzles or fill a shape sorter without trying out every possibility. They also begin to make simple constructions with blocks. With sufficient experience and adult support they learn to recognize, match, and even name some simple geometric shapes, such as circles, squares, and triangles.
Infants and toddlers actively explore the properties of objects in their play and begin to compare and match objects by shape.

- Young infants grasp objects and explore them with their hands and mouth (Belsky & Most, 1981).
- As they grow and develop, infants explore properties of objects, such as size and shape, by fingering, banging, throwing, and rolling them (Palmer, 1989).
- Older infants put objects together in ways that are consistent with the overall properties of those objects. For example, by around 12 months of age, infants put smaller objects inside larger objects (Forman, 1982; Sinclair, Stambak, Lezine, Rayna, & Verba, 1989).
- Toddlers match and compare shapes of objects, at first by trial and error and then with greater skill, to work simple puzzles or put rings on a post.
- Older toddlers begin to learn about simple geometric shapes, such as squares, circles, and triangles. For example, when shapes are the same size and in the same orientation, toddlers can find the ones that match (Clements, 2004).

Spatial sense develops as infants and toddlers explore what they can do with objects and what they can do with their own bodies.

- Young infants roll over, sit up, reach and grasp objects, and pull things toward themselves.
- Infants experiment with what they can do with objects; for example, by dropping a spoon and watching as it falls and lands or pushing a ball to roll it away.
- Older infants and toddlers actively explore how objects, including their own bodies, fit and move in space. For example, they try to fit into spaces that are smaller or bigger than they are, such as a box or baby-doll crib.
- Toddlers are developing their abilities to use landmarks and geometric and spatial cues to navigate through their environment and to locate objects (Reviewed in Sarama & Clements, 2009).

Toddlers begin to use words that describe and name shapes and spatial relations.

- As they are learning spatial concepts, toddlers begin to understand and use spatial language such as “up” and “down”, “in” and “out” (Hart & Risley, 1999; Internicola & Weist, 2003).
- Older toddlers begin to identify basic shapes (circles, squares, and triangles) by their names (Fuson & Murray, 1978; Sarama & Clements, 2009).
Provide materials for infants and toddlers to manipulate and explore shapes and spatial relations.

- For young infants, provide objects such as rings, rattles, soft dolls or animals, and other simple toys that are easy to grasp and manipulate.
- For older infants and toddlers, provide a variety of objects—such as blocks, balls, and simple geometric shapes of different sizes and textures—for children to explore, sort, compare, and match.
- Provide containers, small and large, along with small, appropriate objects for children to put in and take out of the containers.
- Provide materials that toddlers can put together and take apart, such as the following:
  - Duplo blocks or other linking materials
  - Large and small foam and/or wooden blocks
  - Simple puzzles, shape sorters, and nesting cups

Talk about shapes and spatial relations when playing with and caring for children.

- Use language that describes and names of shapes; for example, “Your ball is round;” “Where’s the red triangle?” and “Let’s all hold hands and make a big circle.”
- Talk with children about positions of objects or people; for example, “Sit next to me;” “He’s stepping up;” and “You put baby doll in her bed.”

Provide experiences that support learning about shapes and developing spatial sense.

- Read such books as My Very First Book of Shapes by Eric Carle, Bear in a Square by Stella Blackstone, and We’re Going on a Bear Hunt by Michael Rosen and Helen Oxenbury.
- Engage children in movement activities, including dancing, and action songs like “Itsy Bitsy Spider.”
- Encourage older toddlers to experiment with shapes and space by drawing, painting, and using playdough and other materials.
- Allow opportunities for infants and toddlers to safely explore their environments by crawling, climbing, and walking and by jumping in, out, over, under, and around objects. Provide tunnels and large cardboard boxes to encourage exploration.
Share ideas with families about ways to help infants and toddlers learn about shape and develop their spatial sense during play and everyday routines.

− Encourage families to talk with their infants and toddlers about what they are doing, using descriptive spatial language; for example, “You walked all the way across the room!” “You’re sitting on Daddy’s lap;“ and “Let’s put the blocks in the basket.”

− Share such songs as “The Wheels on the Bus” and “London Bridge Is Falling Down” and games like hide-and-seek that help children develop a sense of where their bodies are in relation to other people and objects. Explain that these activities also help children learn language and develop spatial concepts, such as “up,” “down,” “through,” “around,” “under,” “inside,” and “outside.”

− Describe how everyday routines, like helping to set the table or putting their toys away, help older toddlers develop spatial sense about location and direction.

Ideas for Teachers to Use and to Share with Families:
Learning About Shapes and Space with Containers and Lids

Young children love to play with containers, lids, and other everyday objects found in the kitchen. These kinds of household materials offer endless possibilities for free play and for the exploration of shape and spatial relations. And the kitchen is a place where children and older family members can be close and easily interact. Teachers can help families see that these types of playful moments are valuable for helping children learn concepts that are important to geometry.

Playing with household objects, such as lids and containers, helps children learn about shapes and their characteristics. These everyday materials encourage children to compare, match, organize and sort, and put objects together in a variety of ways. Such experiences help children learn about the characteristics of shapes, such as round, flat, pointy, straight, curved, big, little, long, short, deep, wide, and narrow. Lids and containers also lend themselves to an activity that older infants and toddlers love: “putting in and taking out,“ which helps them develop spatial concepts.

− Encourage families to put containers where children have easy access to them; have similar containers in the classroom.

− Discuss with families and model for them math talk related to shapes and geometry; for example, use such words as “round,” “straight,” “circle,” and “square.”

− Highlight the geometry lessons inherent in materials like nesting pots and pans or matching lids and saucers; for example, make such comments as “That lid is too big” or “Those lids are the same shape!”
References


