

Geometry and Spatial Sense



What You Need to Know

Geometry involves shape recognition and understanding shape properties. Shape recognition consists of distinguishing between shapes and associating shapes with shape names. For example, selecting a triangle from a group of shapes and calling it a ‘triangle’. Understanding shape properties involves learning the defining characteristics of shapes. For example, properties of squares are that they have four equal-length sides and four equal, 90-degree angles.

Spatial sense refers to the knowledge of where you are, how to get around in the world, and how to represent our world, such as by using maps and symbols. Directionality (i.e., describing space in terms of directions to move) and position (i.e., describing space in terms of the location of one object relative to another) are facets of spatial sense. Knowledge of shapes, their properties, and spatial orientation are precursors to later geometry skills.

Things to Consider

Understanding how to compose and decompose shapes is important. This knowledge is foundational for other areas of mathematics. Spatial sense impacts understanding of mathematic domains such as geometry, measurement, patterning, and data. Keep in mind that young children are concrete in their thinking. Therefore, they are likely to have misconceptions related to shapes. For example, young children may have misunderstandings such as ‘a triangle is only a triangle if it has equal sides’ or ‘a square is only a square if it’s rotated a particular way.’ As such, it’s important to show children many variations in sizes and orientations to help them understand the essential properties of shapes. For example, a rotated square is still a square.

Development of Geometry and Spatial Sense

Between 36 and 48 months, children may:	Between 48 and 60 months, children may:
<u>Shape Recognition</u> : Recognize and name typical examples of most common shapes, such as a circle, square, and sometimes a triangle.	<u>Shape Recognition</u> : Recognize and compare a greater number of shapes of varying sizes and orientations.
<u>Shape Recognition</u> : Compare the shapes of real-world objects, such as comparing the shapes of a speed limit sign, a flag, and a tissue.	<u>Shape Recognition</u> : Begin to identify sides and angles as distinct parts of shapes.
<u>Spatial Sense</u> : Begin to understand spatial vocabulary and, with adult support, follow directions involving their own direction in space (e.g., “stand up and stretch your arms to the sky”).	<u>Shape Recognition</u> : Begin to name and describe shapes in terms of length, number of sides, and number of angles.
	<u>Shape Recognition</u> : With adult support, create and build shapes.
	<u>Spatial Sense</u> : Understand more complex spatial vocabulary, following multiple directions involving their own position in space (e.g., “move to the front of the line”).

Setting the Stage

Activities and materials that support the development of geometry and spatial sense:

- ◆ Incorporate shapes and spatial sense into routines and transitions: provide opportunities for children to move their bodies in specific directions (e.g., singing The Hokey Pokey to practice “in” and “out,” or encouraging children to sort blocks during clean-up according to shape properties, including shapes of various sizes).
- ◆ Read books that incorporate shapes and/or spatial sense: use book readings as an opportunity to call attention to or search for shapes, positions, or spatial relationships between characters or objects. For example, *Color Farm* by Lois Ehlert is made up of animal images constructed from common shapes, and *I Spy Shapes in Art* by Lucy Micklethwait challenges children to find shapes in famous pieces of art.
- ◆ For children with visual disabilities: incorporate geometry and spatial sense with tactile materials and/or high-contrast materials. You may also consider using songs and fingerplays to practice shapes and spatial concepts.



OBSERVE	<p>Observe</p> <p>Observe children as they play, draw, or paint during the day. Do you observe them independently sorting objects based on their shape, such as sorting all rectangular blocks together and all triangular blocks together? Are children using any position words already, such as <i>in front of</i>, <i>behind</i>, or <i>next to</i>? Do they follow directions with embedded spatial concepts (e.g., “Put the pencil <i>next to</i> the paper”)? During art activities, do children begin to create shapes (or approximate them) in their work or are they focused more on lines?</p>
FOCUS	<p>Label Shapes and Where Things Are in Space</p> <p>Call children’s attention to shapes and the properties of shapes around them, as well as the position of objects or individuals in space. Be sure to model spatial sense with your own actions.</p> <ul style="list-style-type: none"> ◆ “You found a square piece of fabric to use as a blanket for your baby doll. I notice that we have some longer blankets that are rectangles, and we also have squares like the one you chose. Squares and rectangles both have four straight sides, but rectangles have two longer sides and two shorter sides, but all four sides on a square are the same length.” ◆ “I’m getting out art materials for our project. I know where to find them because I remember that the art materials are here on the shelf below the math games.”
SCAFFOLD I	<p>Prompt Children to Identify Shapes and/or Their Properties</p> <p>Encourage children to name shapes and their properties throughout the day.</p> <ul style="list-style-type: none"> ◆ While children are building with blocks, invite them to describe the shapes of the blocks they are using and the shapes of the structures they are creating. ◆ During lunch, discuss the shapes of the food children are eating, asking them to identify the properties of the shapes (e.g., their sandwich is similar to a rectangle because it has four straight sides, but two sides are longer than the other two; or, their cheese is similar to a triangle because it has three straight sides). <p>To support nonverbal children or children with language delay, provide vocabulary boards with visuals of shapes, position words, and other math vocabulary so children can participate using other methods of communication.</p>
SCAFFOLD II	<p>Prompt Children to Identify Position in Space</p> <p>Ask questions and engage children in activities that will encourage them to identify the position of objects or individuals in space.</p> <ul style="list-style-type: none"> ◆ “(Child) is the caboose today as we walk outside. Let’s look at where (Child) is standing. Where are they in line? Are they in the right place to be the caboose? Yes, they’re at the back of the line, just like a caboose is at the back of a train!” ◆ “It’s time to set the table for our fancy lunch. We need to put our plates in the middle of our spot on the table (<i>pointing to a visual of ‘middle’</i>). Now, if we are supposed to put our cups in front of our plates, where should we put them (<i>waiting for child to point to indicate the location</i>)? And if our forks are supposed to go next to our plates, show me where they should go.” ◆ “We need to figure out where this puzzle piece goes. Where do you think it goes compared to this piece here?” <p>To support nonverbal children or children with limited language abilities, provide vocabulary boards with visuals of shapes, position words, and other math vocabulary so children can participate using other methods of communication.</p>
Friday KEEP IT GOING	<p>Consider what you learned from observing children on Monday as well as their reaction to your Focus and Scaffolds. Find ways to build the activities from Setting the Stage into your regular routines.</p>