Preschool teachers can create an environment in which children are eager to explore and learn about math. They can provide developmentally appropriate materials and opportunities to help preschoolers understand the topic. Math can be a part of daily routines, activities, and interactions in preschool.

The Common Core State Standards for Mathematics (CCSSM) are written to ensure students will leave school ready for work and college. In the CCSSM, two critical areas make up kindergarten content. The first is representing, relating, and operating on whole numbers with sets of objects. The second is describing shapes and space (NGA Center & CCSSO 2010). By the end of kindergarten, children need to demonstrate understanding by analyzing, comparing, creating, and composing these shapes. Preschool teachers have numerous opportunities to help children begin to develop their understanding of shapes and space.

Recognize and compare two- and three-dimensional shapes

In preschool, children can learn to identify and name circles, triangles, squares, rectangles, and ovals. By using materials such as posters, blocks, books, and games, teachers expose children to various shapes and help them analyze two- and three-dimensional shapes in various sizes and orientations.

The following strategies and activities can help preschoolers learn to recognize and compare shapes.

• **Identify shapes.** Introduce children to different kinds of triangles, such as equilateral, isosceles, scalene, and right. After finding them in the classroom or outdoors, children can outline the triangles with colored tape.

For example, they might make right triangles red and scalene triangles blue.

• **Introduce math words.** Create a math word wall or incorporate mathematical words into the existing word wall—color-code the math words to make it easier for children to notice them. Be sure to write math words in English and in children’s home languages. Teachers can use real objects, photos, and black line drawings to define the words.

• **Compare shapes.** Ask children to identify different sizes of the same shape. For example, in the classroom they could search for rectangles, such as windows, doors, books, shelves, cabinets, computer screens, tabletops, and cubbies. Next, help children think as they compare the sizes of rectangles. The door is bigger than the cubbies. The cubbies are bigger than the book, but they are all rectangles. Encourage children to do the same with triangles, circles, and other shapes.

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• **What's the difference?** Explain the differences between two-dimensional (flat) shapes and three-dimensional (solid) shapes. How are the book and piece of construction paper the same? How are they different?

• **Create a shape-scape.** Teachers and families can collect three-dimensional objects such as cans, cartons, boxes, and balls to create a shape-scape. Children can use cylinders (paper towel rolls) as tree trunks, spheres (balls) as treetops, and rectangles (cereal boxes) as buildings. Teachers and children can work together to label the shape-scape, count the number of shapes used, and plan additions to the structure.

• **Go from 3-D to 2-D.** Preschoolers can dip three-dimensional objects in paints and press them on paper to make prints. Cans, spools, candles, and drinking glasses work well. The children will see the flat shapes that make up the sides of the objects.

• **Discover shapes outdoors.** Look for manhole covers, flags, windows, signs, and other distinct shapes. Working together, children and teachers can take photos of the shapes, label them in the photos, and assemble the photos into a class book.

• **Learn new vocabulary.** Introduce words such as thick, thin, small, large, long, short, facet, slide, flip, and turn in English and home languages during meal and snack times. Offer snacks with various dimensions and encourage children to use comparative words when asking for food. I’d like the long carrot, please. Add these descriptive words to the word wall.

• **Play shape hokey pokey.** Have each preschooler hold a shape and put it in the circle instead of a body part. Put your square in. Take your square out. Do the hokey pokey and turn yourself around.

• **Play a shape guessing game.** Have preschoolers play in pairs. Explain that one child will hide the shape behind her back and the other will ask questions about the shape. Does the shape have three sides? Does the shape have four angles?

• **Offer geoband challenges.** Teachers can offer geoboards and geobands so children can create as many different shapes as possible. Provide an additional challenge by asking children to color-code the shapes.

### Create and take apart shapes

Once preschoolers can correctly identify flat (square, circle, triangle, rectangle, hexagon) and solid or three-dimensional shapes (cube, cone, cylinder, sphere), they are ready to create and then take apart shapes using materials provided by their teacher.

• **Make a shape.** Offer toothpicks, pipe cleaners, straws, or craft sticks as materials children can use to make into shapes. Discuss the shapes they make. That’s a triangle. How could you turn it into a square?

• **Create new shapes.** Children can glue together two or more shapes cut from paper onto a blank piece of paper to form other shapes. You glued two triangles together to form a rectangle.

• **Create solid shapes.** Children can roll, pinch, and manipulate play-dough or clay to make two or more shapes. Then they can combine their creations to make new shapes.

• **Deconstruct shapes.** Children can explore how to form three-dimensional shapes. For example, let children watch as you cut rectangular containers such as cereal boxes. How many rectangles are there in the box? Then ask children to figure out how to put them back together.

• **Play with tangrams.** Have several sets of tangrams and pattern cards on hand. Children can start by laying tans on each pattern. They can progress to re-creating the pattern on another surface and making up their own patterns.

• **Build a hexagon puzzle.** Cut one hexagon into trapezoids and triangles. Invite children to use those pieces to fill in another hexagon of the same size.
Spatial visualization

Encourage preschoolers to slide, flip, or turn shapes to promote problem solving and an understanding of transformations. These transformations are crucial to developing spatial visualization abilities and understanding geometry, which involves matching shapes through visualization.

- **Use the correct terms.** A turn is a *rotation*. A flip is a *reflection*. A slide is a *translation*.

- **Send pattern cards and tangrams home.** Encourage families to play, discover, and name transformations at home as they duplicate figures on the cards. *Can you rotate the triangle to fit the figure? I saw you slide the rectangle.*

- **Play a transformation game.** Give children dolls or stuffed toys and point out the front and back of each toy. Call out directions—*flip your doll up, turn your teddy bear on its side*—to see if preschoolers can demonstrate the transformations. After they master flipping the toys, have the children practice with shape pieces.

- **Play Mirror, Mirror.** Give each child a single set of pattern blocks and a small mirror. Ask children to create a design with their blocks. Then have them hold the mirror up to each side of the design to see how it appears to be flipped in the mirror.

> **Transformations**

These are transformations:

- **Rotation**

- **Reflection**

- **Translation**

After any of these transformations, the shape still has the same size, area, angles, and line lengths.
Spatial orientation

As preschoolers learn to identify objects, they can use spatial orientation vocabulary to describe the relative positions of objects. Preschoolers should understand and be able to use positional words such as above, below, beside, in front of, behind, next to, between, on, over, under, and inside.

• Focus on a word a week. Introduce the word in English and children’s home languages. Use the word throughout the day in the classroom, in the hallway, and on the playground. You are sitting beside a friend. Place your napkin beside the plate. Stand beside your partner.

• Pair positional and shape vocabulary. The clock is a circle. It is beside the door, which is a rectangle.

• Create a book. Invite families to write about a favorite activity using positional words. We drove next to the park, traveled under the expressway, and walked over the bridge. Children can provide the illustrations.

• Use photo examples. Take photos of the children demonstrating positional concepts. Hong is standing under the clock. Add photos and words to the word wall.

• Play spatial Simon Says. Give each child in a small group a stuffed animal and play Simon Says using positional vocabulary. Simon Says put your animal above your head. Put your animal under your chair.

• Create positional obstacle courses. Encourage preschoolers’ use of positional words during play or transitions. Before going outside, climb up the steps, slide down the slide, jump over the cones, and line up next to the door.

• Narrate actions with orientation. Use positional words to describe how the children move from one place to another. You parked your trikes on the playground and next to the window. You walked under the skylight and over the carpet to enter the classroom.

Conclusion

Preschool teachers can create environments and plan activities so young children and their families are both enveloped and engaged in mathematics. Programs can feature numeric and geometric representations with appropriate vocabulary terms. Beyond the classroom, preschoolers can discover and enjoy mathematics in their homes and communities. TYC

REFERENCE


RESOURCES

