

Some activities based on geometry and fostering spatial sense are described here. While these activities are roughly listed in order of difficulty, many can be expanded to be more challenging or can be streamlined to simplify them.

String Shapes

Three or four children hold a large string loop. They make a variety of shapes by adding or taking away a vertex or a side; changing the size of an angle, or increasing or decreasing the area of a shape.

Children enjoy making shapes as the leader of the activity names them. They find that a triangle is easy to make because it can be skinny, fat, or “just right” and still be a triangle. A square is harder because all the sides must be exactly the same. Children are often surprised that a circle is one of the hardest shapes to make with string, as it is easy to draw. As one child explained, “Circles are easy to draw because you don’t have anyone holding the line and making a point. They are much harder to hold.”

Reenacting Stories

Children act out stories they have heard recently using position words such as *above, below, down, up, right, left, under, top, bottom, side, beside, and through*. Children either represent the characters in the stories themselves, or they model the stories by using storyboards.

The storyboards depict settings of recently studied themes or projects and can be used as backdrops for a variety of stories. Using objects to represent characters, children model stories by placing items appropriately on the storyboard. They use position words to describe the characters’ actions.

“The Three Billy Goats Gruff” is a great story for children to perform; it is especially popular with prekindergartners. A small table can be used as a bridge. The narrator emphasizes many position words (such as *under, over, after, next, between*) and size words (such as *big, middle, little*) to describe the action as children act out the story. Afterward, the story can be rewritten with the characters in different locations (the troll on top of the bridge, the billy goats trotting under the bridge), which children often find amusing.

Kitchen Prints

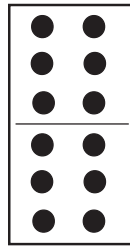
Children use a variety of kitchen utensils to make paint prints in the art center. The prints must fill up an entire piece of paper, but the individual prints on the paper may not touch one another. Forks, spatulas, handles, plastic lids, the tops of pans, cheese graters, slotted spoons, and food brushes create unique prints in a variety of shapes and partial shapes.

Activities

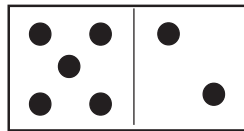
Children generally take great care in spacing the individual prints so they do not overlap. When finished, they describe the paint prints using shape and position words and have fun guessing which tools made the prints in each other's pictures.

Domino Flash

With half of it covered, the pip side of a large domino is quickly shown to the children. Based on their fleeting view of the pattern of the pips, children



decide what number is displayed on that part of the domino. When children become comfortable with this activity, both halves of the domino face are shown and children must add the two amounts. (It is best to use a domino set with "double-six"—six pips on each half—as the highest value, as this activity may be too difficult for young children if higher values are used.)



Children quickly learn what the arrangement of pips for 1, 2, 3, 4, 5, and 6 look like. When asked how they recognize the numbers so quickly, their responses reveal their understanding of number as well as spatial sense. When Allen was asked how he knew five pips stood for 5, he said, "It's one in the middle and two up and two down. You don't even need to count—it's just there!" Jelani said that 2 was

"so easy—there's one in one corner and one in the other corner. Easy!"

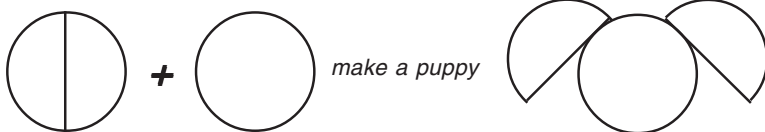
Making Frames

Children construct frames for three-dimensional shapes by bending pipe cleaners around objects found in the constructing center. (A section of the frame is lifted up to remove the object.) The frames are then displayed and children try to guess which shapes match which frames.

This activity fosters an understanding of shape and space. Children enhance their knowledge of edges, faces, and vertices when they resolve the problems of "making this part straight" or "getting all the pieces to meet at one point."

Treasure Map

Eric Carle's book *The Secret Birthday Message* is a delightful story about a boy searching for his birthday surprise—a new puppy. The book uses many



direction and shape words. A map at the end of the book visually represents story events, using shapes and arrows to indicate directions.

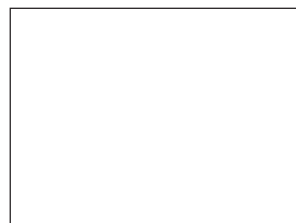
After listening to the story and studying the map, children make their own maps of the classroom, complete with shapes, arrows, and a hidden puppy. These wonderful maps can be created entirely using shapes. For example, the teacher's desk becomes a rectangle, the clock a circle, the doorway a rectangle, and the cabinet door a square. A puppy can be constructed by using two circles and cutting one in half to make ears.

When the classroom maps are finished, children "read" each other's to see if they can find the puppy. The maps are saved and often shared with other classes.

Quick Draw

Children are briefly shown one or two shapes, which they quickly draw. Afterward, children discuss and describe the shapes or draw pictures using them. These pictures can be kept in a special "shape journal."

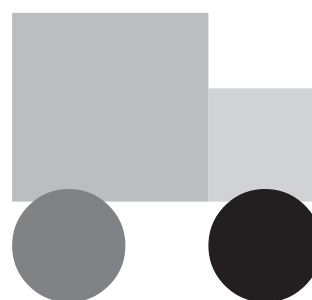
This activity is especially well suited to prekindergarten classes, although older children also enjoy it. After drawing a shape, children often create more pictures to put in their shape journals by drawing patterns featuring that shape. Other shapes can be included in the pictures as well. Some children prefer to draw the circle because "it's easy." Other shapes like hexagons are harder for children to draw, but after tracing cut-outs of these shapes, children recognize them more readily and their drawings improve.



Shape Pictures

In this excellent learning center activity, children compose pictures using specified numbers of circles, triangles, and rectangles. First, children cut multiples of these shapes in various sizes from construction paper. Using a spinner divided into thirds (labeled *circle*, *triangle*, and *rectangle*) and a die with pips from 1 through 6, children spin the spinner and roll the die, select the appropriate number of the shapes indicated, and repeat the process once more. They then make pictures using the shapes they selected. Children display their pictures and describe their constructions using shape and position words.

The pictures can be quite interesting. Squares become animals, houses, or robots. Circles are often used as parts of flowers, the sun, or spots on a dog. Triangles become people's heads, tops of buildings, or race cars.



Secret Socks

Children create their own “secret socks,” which contain several mystery shapes. A child threads two or three shape beads onto a pipe cleaner, folding the ends so the beads will not fall off. He places the pipe cleaner and beads in a secret sock. The secret socks are then traded. Children feel the shapes inside the socks *without* looking, and in their own words, they describe what they think is inside.

Children’s descriptions are typically connected to everyday objects. They describe the sphere as a round ball, the cube as a box, and the cylinder as round with flat like a can. Using another pipe cleaner and shape beads, the children then make a copy of the shapes they believe are inside. Finally, answers are checked by opening the secret socks. The teacher may need to explain that beads of the same shape match even if they are different colors.

Mystery Shapes

The teacher or a child hides a three-dimensional shape in a box. The teacher or child gives clues, and children try to guess the hidden shape. For example, a child’s clues for a rectangular block might include, “It’s shaped like a cereal box. What shape do I have?”

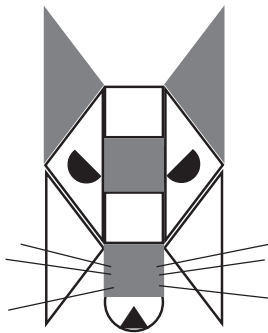
Tangram Creations

Using one or more sets of construction paper tangram pieces, children can create original designs or follow pictures from tangram shape books. Pictures are named, described, and displayed for everyone in the class to see. This is a great activity for 4-year-olds, as long as they have enough time to experiment with the shapes.

Picture Pie Books

Ed Emberley’s series of *Picture Pie* books are filled with pictures made from circles, squares, and partial shapes. He gives step-by-step directions for making insects, puppies, flowers, letters of the alphabet, and a variety of real and pretend characters.

Children view the directions and make the pictures of their choice, tracing the shapes needed or following the templates provided in the book. The pictures are easy to adapt or simplify. When associated with a particular theme or story the children encounter in any part of the curriculum, these pictures help them make connections between mathematics and other areas—social studies, science, art, and so on.



Bubble Wands

Children bend pipe cleaners into bubble wands of different shapes, predict what shapes the bubbles blown with these wands will be, and then blow bubbles. How surprising that all the bubbles are spheres! The children try over and over again to make cube or pyramid bubbles. Alas, bubbles are always spheres!

This activity provides useful experience in constructing shapes and recognizing spheres, but at this level the children are not given any scientific explanations of this phenomenon.



Aka Backa Soda Cracker

The Aka Backa Soda Cracker game helps children learn to recognize shapes and pass an object from right to left. It may also help the teacher to assess children's understanding of shape words.

Children sit in a circle and pat their legs in time to "Aka Backa Soda Cracker." The song is sung "Aka backa soda cracker, Aka Backa BOO [at BOO, everyone claps his hands in the air], Aka backa soda cracker, pass to you!" After learning the words and rhythm of the song, each child gets a manipulative shape. The teacher models how to pass from right to left. (The teacher may also wish to explain that moving from right to left inside the circle is like the movement of the hands of a clock, and that this circular direction is called *clockwise*). When the words "Pass to you!" are sung, children pass their shape to the person on their left and receive a new shape from the person on their right. If done correctly, all pieces move one at a time in a clockwise direction. The game continues for as long as the class wishes.

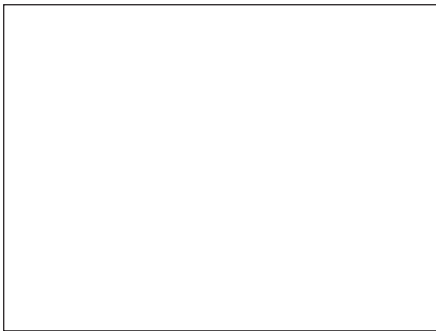
Once the passing motion is error-free, the children are ready for a modification of the game. A leader for the activity is selected. Periodically, the leader says STOP at the end of a verse and then states the name of a shape. Anyone who has that shape holds it up in the air. Using descriptive terms like *side* and *corner*, the children holding that shape trace around it and describe it in unison, led by the leader. Those who do not have the shape hold their fingers up in the air and trace an imaginary shape.

Teachers should not teach this game too quickly, or the children may not master the passing motion. If passing from right to left is modeled step-by-step, then children learn it easily and never seem to tire of the game.

Creating a New Playground

Children in second grade design their ideal playground by constructing a model using blocks and other materials. The children draw building plans for their model, using a key of their own design with symbols that can be easily interpreted. Symbols might include a green rectangle to indicate a wooden plank or a red line to represent a metal bar. This activity is a good early exercise in symbolic reasoning.

Bubble Windows



In this popular activity, children form quadrilaterals from string and straws. After dipping these frames in a bubble solution of liquid soap and water, children investigate planes as well as the many different shapes that can be made from two or more bubble windows that intersect. Because of the surface tension of soapy water, bubble windows can be combined in interesting and unusual ways and can be manipulated easily. The children make fascinating discoveries about shape properties and planes.

What Am I Seeing?

Three-dimensional shapes—pyramids, cubes, spheres, cylinders—are placed on the overhead projector and covered with a thin piece of paper. The children try to guess what shape is on the projector by looking at the image on the screen. If a dark circle is on the screen, children may guess that a cylinder is on the overhead projector, since they know that cylinders have circles on both ends. Shapes such as a pyramid are more challenging; a pyramid can be set on its square base or on a triangular side on the projector, so a triangle or a square may appear on the screen.

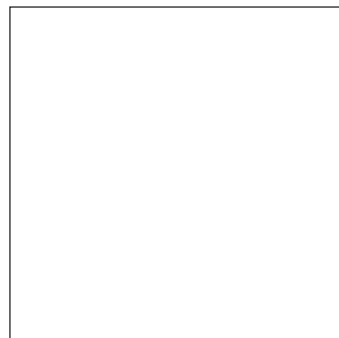
This activity for learning about the relationship between two- and three-dimensional shapes is generally appropriate for children in second grade, or perhaps at the end of first grade. Children are able to see that three-dimensional shapes are made up of *faces* of different geometric shapes.

Straw Towers

Groups of children are challenged to make a tower one meter tall that can withstand a hurricane and an earthquake rated 7.5 on the Richter scale. The hurricane strikes when everyone blows as hard as possible on one side of the tower and then on the other side. The earthquake hits when the teacher shakes the tower's cardboard base as hard as possible seven-and-a-half times. The tower is made with a maximum of 25 straws, 10 paper clips, a foot of masking tape, and one cardboard base.

The teams design, build, and name their towers. The children are given many opportunities to try out their ideas before testing the towers against the elements. When one of the towers withstands the weather, the architects are very proud.

After analyzing the results, children typically hypothesize that triangular bases are the strongest. They begin to observe other buildings and structures to validate their findings.



Cube Constructions

Children are challenged to build different constructions from five cubes that attach to each other. There are 29 possible constructions. Each construction must be built so that it can be picked up, flipped, or moved in any way and not match any other construction. All cubes must be connected in each construction.

This is a good group problem-solving activity, as children can work in teams to make the different constructions. Children often find 29 different ways to connect the five cubes, but upon closer inspection the constructions they create may not all be different. Unique constructions are displayed so children can compare their efforts. This is an excellent task for persistent builders!