The learner will explore concepts of geometry.

3.01 Identify, build, draw, and name triangles, rectangles, and circles; identify, build, and name spheres and cubes.

Notes and textbook references

3

The building of mathematical vocabulary takes place over time. As words related to directions, positions in space, comparisons, sizes, and movements are used to describe actions for the children to model, they gradually incorporate the terms into their own repertory.

A. Geoboard Shapes

Materials: one geoboard per child; geobands

Instructions: Teacher poses questions. "Can you make a little (name a shape)? (triangle, square, rectangle, circle), Can you make a big one? How many can you make on your board? Can you make a picture using a (name a shape) and a (name a shape)?"

After each problem, let four or five children share by displaying their shapes on the ledge of the chalkboard. Have children give new questions to partners.

B. I Spy

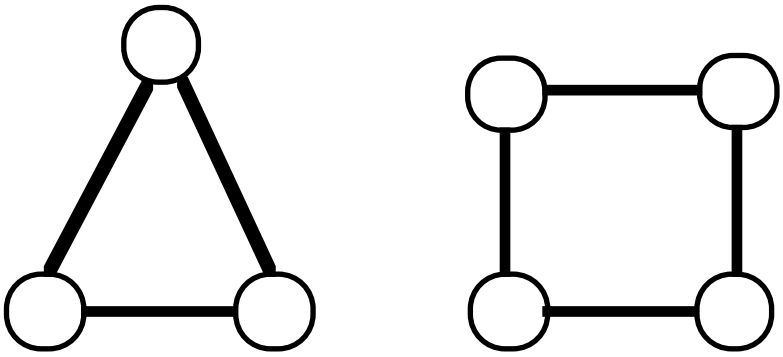
Materials: None

Instructions: Locate an object in the room. Say "I spy with my little eye something that is (name the shape)." Let the children try to guess by asking questions which give a lot of information. For example, "Is the round thing on the side of the room?" or "Is the rectangle larger than my book?"

Notes and textbook references

C. Corners and Sides

Materials: toothpicks or coffee stirrers; clay, miniature marshmallows or gumdrops (If you are using clay, have each child prepare 10-15 small balls from the clay.)



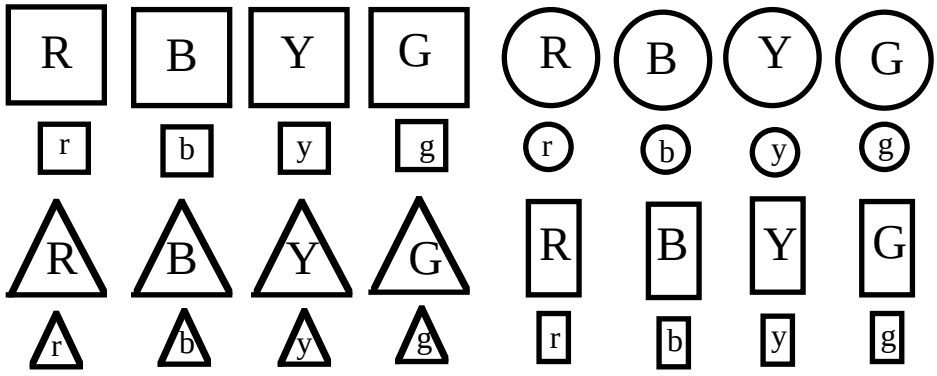
Instructions: Guide the children in making shapes using the materials listed above. Encourage students to discuss their shapes as they make them.

Follow-up: After the children have made a variety of shapes, use the shapes to generate discussion of likenesses and differences between figures, emphasizing the corners and edges of specific shapes.

Extension: This activity could also be used when your class is working on 3-D shapes. Cubes, pyramids, tetrahedra, etc. could be made. Also try tinker toys to build polyhedra.

D. Twenty Questions

Materials: A set of Relationshapes such as the following:



Notes and textbook references

Instructions: Place the set of blocks where they can be seen by all the children. The teacher or leader mentally chooses a block. The children ask yes or no questions to eliminate blocks which are then removed from the set until they guess the mystery block. The same activity can be played with 3-dimensional models.

E. Shape Detectives

Shapes and shape relationships help students describe and make sense of the world around them.

Materials: clue cards (see Blackline Master III - 46 for sample cards); set of Relationshapes or Attribute Blocks (one of each shape in each color, large and small)

Instructions: Place Relationshapes where they can be seen by all children. The teacher reads the clue card slowly, giving the children a chance to think about each clue. The first couple of times you play this you may need to physically remove the eliminated shapes. With practice, the children can do this mentally. Write more clue cards for other shapes. Let more advanced children create their own clue cards for the class to solve.

Variation: This game can also be used to review 3-dimensional shapes. You will need a set of shapes: cube, cone, cylinder, sphere, tetrahedron, pyramid, and rectangular solid. Place these where all children can see them. Use the three-dimensional cards (see Blackline Master III - 47).

F. Path of Shapes

Materials: relationshapes and matching spinner (see Blackline Master III - 48) or pattern blocks and matching spinner (see Blackline Master III - 49); one game marker per child; stamps of shapes, cut outs, or templates

Instructions: First have children make their own gameboard by laying out a path of shapes. They can draw, trace, stamp or paste shapes along the path. You will need to give some direction concerning the number of shapes in the path so the gameboards are equal in length. Children could decorate their gameboards and name the game to be played.

The children play in pairs. Children take turns spinning the spinner. After each spin, the child will name the shape on the spinner and advance his marker to that particular shape in the path. The player who reaches the last shape on the path is the winner. (Note: The length of the path will help determine the length of the game.)

Notes and textbook references

G. Go Fish!

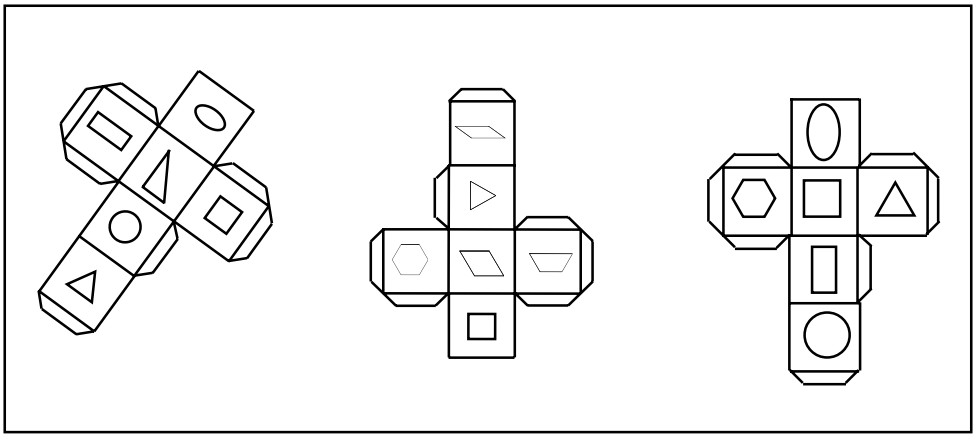
Materials: pattern blocks, Relationshapes, or Legos; bag for manipulatives

Instructions: Place 50 pieces of one of the manipulatives in a bag, making certain that there is a match for each piece. Students can play in groups of four to six. Ask each child to pick five shapes. The objective for this game is to find a match (color, size, shape, and thickness) for each piece. Children take turns being the shape fisherman. The fisherman holds up a shape and calls another child by name, asking if he or she has that shape. ("Do you have a green triangle?") If a match is made the child keeps both blocks. If a match is not made, the fisherman must "Go Fish" in the bag of shapes. The game continues as children go around the group taking turns being the fisherman.

H. Shapes Race

Materials: shape templates, (use clear plastic lids, trace one shape on each lid and cut out with an Exacto knife or very sharp scissors); shape die; (see Blackline Masters III - 50 through III - 52); and paper

Instructions: Children take turns rolling the die and drawing shapes. Each child rolls the die, finds the appropriate shape template, and traces the shape on his or her record sheet. The children continue rolling the die and tracing shapes until one child has five of the same shapes. That shape is the winner. At group time the child can show the record sheet and tell about the shapes made.



Variations: Children may play in pairs. As one player rolls the dice the other player is in charge of the templates. After asking for the correct template, the child then traces the shape in the appropriate column to create a graph. The first player to fill a column with five of the same shape is the winner.

I. Shape Hunters

Notes and textbook references

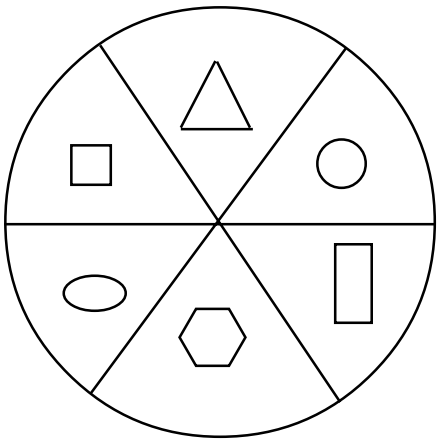
Materials: shapes cut out of paper: circles, squares, rectangles, triangles (about five per person); masking tape
Instructions: Children look around the room and point out recognizable shapes. Have children draw the shapes in the air with their fingers. Give each child five paper shapes and have the children walk around the room taping their shapes to the appropriate objects in the room. After this activity, have children list objects in the room that consist of more that one shape.

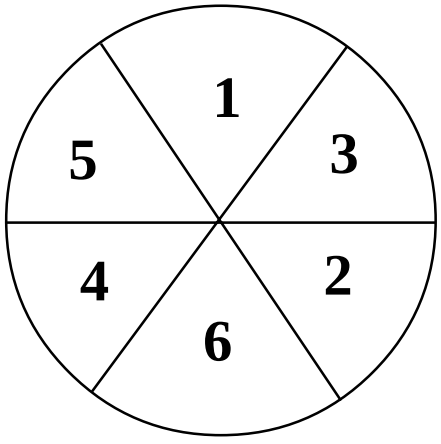
J. Shape Spin

Materials: Relationshapes or Attribute Blocks (10 assorted shapes per child); spinner (see Blackline Master III - 48)

Instructions: Children work in pairs or small groups. Each child selects 10 shapes. Children alternate turns spinning the spinner and naming the shape. If the player has the shape on the spinner, it is placed in the middle. If not, play moves to the other player. The first player to return all shapes to the middle is the winner.

Variation: Use collections of pattern block pieces and the appropriate spinner (see Blackline Masters III - 49 and III - 53).

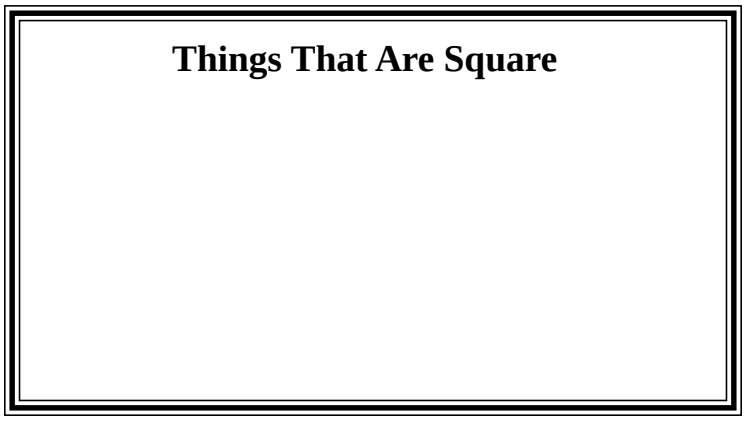




Notes and textbook references

K. Shape Posters

Materials: large pieces of posterboard or butcher paper; glue; scissors; old magazines



Instructions: Have children create shape posters by cutting pictures from magazines and gluing them to posters. Focus on one shape at a time. For example, ask all children to look for circles or divide the class into groups and work on several shapes at one time. Children can sort their shapes onto the appropriate poster if they find good examples for their friends.

L. Feel a Shape

Materials: pattern blocks and matching spinners, or Relationshapes and matching spinner (see Blackline Masters III - 48 and III - 49); one "feely" sock per child (small, clean can with taped edge pushed into tube sock)
Instructions: Children work in teams of two to four. Each team needs a spinner. Each feely sock has 10 assorted shapes inside it. Children take turns spinning the spinner at every spin. Each player tries to find the shape in his or her feely sock. If a child finds the shape, the student names the shape and places it in the discard pile. Play continues until one child has discarded all of his or her shapes. ***Note:*** Remind children to identify shapes by feel, not sight.

M. Spin and Count Shapes

Materials: one shape spinner and one number spinner per team; one recording sheet per child (see Blackline Masters III - 53 through III - 55); crayons

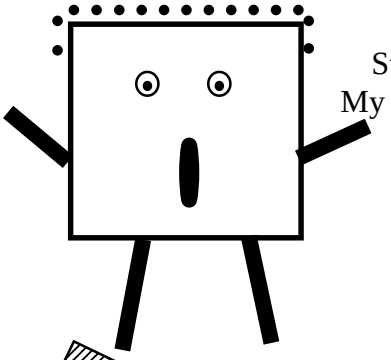
Instructions: Children work in pairs. Each child in turn spins both spinners and reads the spin. ("I have three triangles.") The child then colors the appropriate number of shapes on the recording sheet. The first person to completely fill the recording sheet is the winner.

N. Shape Puppets

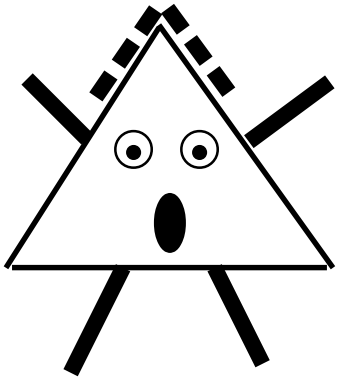
Notes and textbook references

Materials: assorted colored paper; popsicle sticks; glue; shape templates; crayons

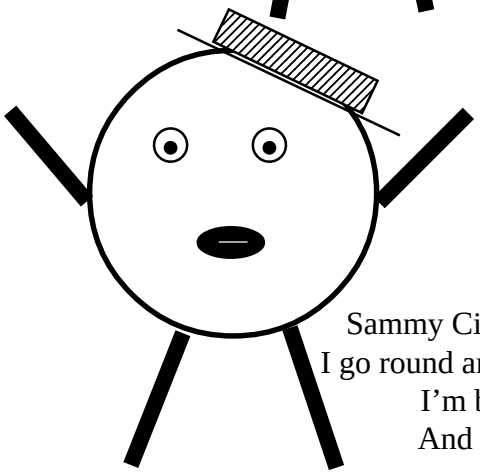
Instructions: This activity is designed to help children learn the names of shapes. Children will trace and cut out the shape of the day and draw a face on it. The teacher may wish to have different models for children to use before they make their own. Early in the year, the teacher may choose to glue the shape to the popsicle stick to use as the puppet. The children might learn an appropriate rhyme to go with the shape of the day.



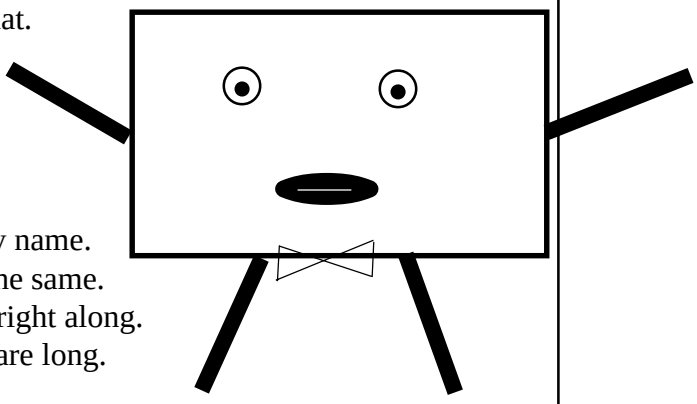
Steve Square is my name.
My four sides are all the same.



Tina Triangle is the name for me.
Count my sides: 1, 2, 3.



Sammy Circle is my name.
I go round and round the same.
I'm big and fat.
And that is that.



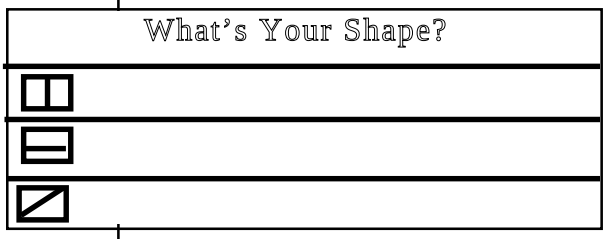
Ricky Rectangle is my name.
My four sides are not the same.
Compare my sides, come right along.
Two are short and two are long.

Notes and textbook references

O. Sandwich Graph

Materials: peanut butter; several plastic knives; for each student: a slice of bread, a small paper plate; class graph with title "What's Your Shape"

Instructions: Demonstrate how to spread peanut butter to make a sandwich. Ask children to talk about all the ways you might cut the bread into halves. Have students then make their sandwich and choose how to divide it in half. Graph the choices.

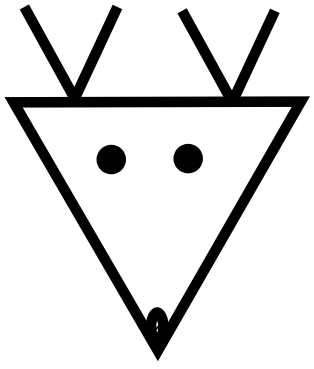


Variation: Cut the sandwich into fourths making rectangles, squares, and triangles. Use basic shape cookie cutters and graph the shapes.

P. Rudolph Sandwiches

Materials: one slice of whole wheat bread per student, peanut butter, two raisins and four pretzel sticks per child, half of a cherry or one cinnamon red hot per student

Instructions: After you demonstrate, children can "read" the directions (see Blackline Master III - 56) for making the Rudolph sandwich from picture clues. First, cut bread into two triangles and "glue" together with peanut butter. Use peanut butter to glue on raisins for eyes and red nose. Place pretzels between the slices of bread to form antlers.



3.02 Compare geometric shapes (identify likenesses and differences).

Notes and textbook references

A. Teacher places triangles, circles, rectangles, and squares on the table. The student is asked to find all of the triangles and tell about them. Repeat with other figures.

B. Ask student to make a specific polygon, for example, a triangle, on the geoboard. The teacher makes another sample on a second geoboard. Place geoboards side by side to compare and ask, "Are these figures both triangles? How do you know?"

C. Student closes eyes as a shape is placed in the child's hands. Child is asked to describe the shape and identify the figure by touch.

D. Using string, tinker toys, toothpicks, straws and clay, etc., student creates models of squares, triangles, rectangles, and circles. Ask the student why shapes made with straight lines are easier to model than circles. Ask the student which shape he or she prefers to draw. Why?

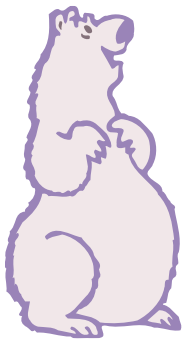
E. Have children go on a Scavenger Hunt either at home, in school, in a book or magazine to find a circle, square, rectangle, and triangle. Share the findings with the class.

F. Provide children with old magazines or workbooks and have them work in small groups to find pictures of certain shapes. Have a group search for circles, one for squares, one for rectangles, and one for triangles. Cut these out and glue them on poster board to be displayed.

Notes and textbook references

3.03 Model and use directional and positional vocabulary.

Students should experience words which focus on directions or positions such as over, in, under, on, up, down, before, after, between, near, far, first, last, beside, around, above, below, next to, behind, in front of, beneath, right, left, and middle. They need to use themselves as models, toys or counters as models, and finally explain the directional/positional words in pictures.



A. Buildings and Bears

Materials: each child needs: a red block, a green block, a blue block; a red bear, a green bear, a blue bear; workspace (laminated paper or piece of felt)

Instructions: Give students the following directions on how to position their objects:

Build a tower with all of your blocks.
Put the blue bear on top of the tower.
Put the green bear in front of the tower.
Put the red bear behind the tower.

Change instructions by using words such as *middle, beside, near,* and *far.* Have children take turns being teacher and giving directions to partners.

Variations: Collect school milk cartons for each child. Cover them with construction paper and form a little village. Ask children to put their bear *beside*, *in front of*, or *near* the building that is being described. Cut the top of the carton and use it as a removable roof to explore the position word *inside*. Again, ask children to work in pairs with their milk cartons and bears. One child gives directions using position words while the other child places the bear in the proper place. Encourage children to verbalize the positions of the bear after placing it. "My bear is *between* the houses."

B. Right and Left

Materials: red and yellow stickers; red and yellow string; red and yellow paper

Instructions: Work with the direction word "right" for several weeks. Use a variety of activities. Put a red sticker on the right-hand side of each child's desk. Put a red string around each child's right wrist. Have students get out of their chairs on the right-hand side. Put a red sticker on each child's right shoe. Make a red outline of each child's' right hand.

Once children have mastered the position word "right," put a yellow sticker on the left-hand side of each child's desk. Put a yellow string around each child's left wrist. Put a yellow sticker on the child's left shoe. Make an outline of each child's left hand on yellow paper. Show children that the left hand can make the letter "L."

Notes and textbook references

For more kindergarten math ideas, see the Addenda book K, published by the National Council of Teachers of Mathematics. For ordering information, call 1-800-235-7566.

C. Building with Blocks

Materials: unit blocks, Cuisenaire Rods, or Legos

Instructions: Use the following suggestions to guide or extend the children's play with blocks.

"Build something that boats can pass *under* and cars can travel *over.*"
"Make a building *beside* the bridge."
"Build a wall. Build something *outside (inside)* the wall."
"Build something that a kitten could fit *inside*."
"Build something that you could crawl through *(over, under*)."
"Build a house. Put a chimney *on top of* the house."
"Build a dinosaur. Then build a tree *behind* the dinosaur."
"Make a table. Build a footrest *under* the table. Tell your partner what to build."

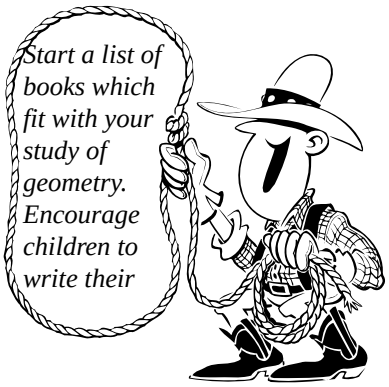
D. Pictures and Patterns

Materials: flannel board and felt pieces or magnetic board and magnetic pattern blocks; shape templates; colored pencils; paper

Instructions: Ask children to create designs or patterns and share their work using positional words. Teacher modeling is important. Since positional and directional words are relative, you will want to use sentences such as, "The red teddy bear is *near* the book *beside* the pencil. It is *behind* the glass."

E. Teacher reads story such as "Three Billy Goats Gruff" to students. As children retell story, one child acts out each part. (This story uses many comparative words as well as directional terms.)

F. Student uses blocks or cartons to construct a miniature "play ground." Using a teddy bear counter or other toy animal, child will illustrate directional words suggested by the teacher.



Notes and textbook references

G. Hula Hoop Fun

Materials: hula hoops, one for each group of two (or three) children

Instructions: Inside/outside

1. Give directions using inside and outside. "If you are wearing tennis shoes, stand inside the hula hoop." Other examples include: birth day in the summer, can whistle, wearing stripes.
2. Put your hands inside, put your arm inside, put a leg inside, put both feet inside, put your whole self inside.

Top/Middle/Bottom

Have children choose a partner and play "Simon Says" as you give directions such as these: "Simon says to hold the hula hoop high over your head. Put it low-under your waist. Simon says put hoop low-under your shoe. Simon says move it to the middle-near your waist. Hold it high-near the sky. Simon says to put it on top-near your ears."

In Front/Behind/Beside

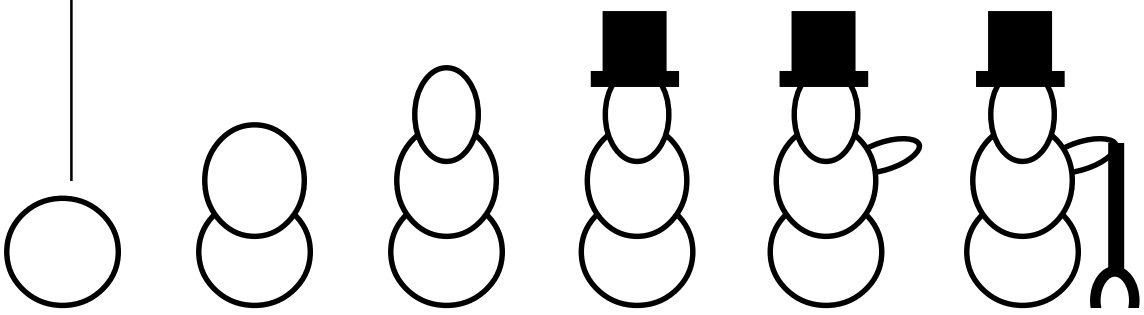
One partner holds the hula hoop as the other child follows the teacher's directions of where to stand (in front of, behind, beside, near, far). Have partners switch places and continue.

H. Copy Cat

Materials: crayons, colored pencils; paper

Instructions: The teacher draws on part of a picture and the children do the same. Invite students to discuss each shape and line using position words.

Example:



I. Above or Below - Left or Right

Notes and textbook references

Materials: shapes of various colors (circles, squares, rectangles, triangles- two of each for each student); paper for each child with a line dividing it into a top and a bottom section.

Instructions: Ask children to pick up one of their triangles. Give oral directions such as, "If the triangle is red, place it above the line. If it is not red, place it below the line." Continue giving clues until all eight shapes have been used. Have students discuss with a partner how their designs are alike and different. Have children count the number of shapes they have above and how many they have below the line. Which section has more? Instruct children to turn the paper sideways and continue the activity using oral clues for the direction words left and right.

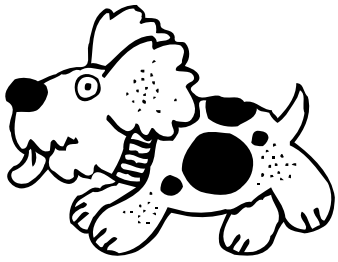
For more kindergarten math ideas, see the Addenda book K, published by the National Council of Teachers of Mathematics. For ordering information, call 1-800-235-7566.

J. Twins

Materials: pattern blocks or Legos; file folder

Instructions: All children in the group are given identical sets of 3-5 pieces (begin with three). Stand a file folder so that it blocks the children's view of the teacher's pieces. The teacher builds a figure and then gives directions to the group for building the same figure. Through clues about the color, size, shape, and position of each piece, the children try to build an identical figure. After the children have built their figures, the folder is removed and the figures are compared. The teacher leads a discussion about the results:

> Are the figures the same? If not, how are they different?
> Which clues were easiest to follow?
> Which clues were hardest to understand?
> How could you change the clues so they would be easier to follow?
> What things could you do differently next time?



Play this activity as a group several times before putting the activity out for students to play in pairs.

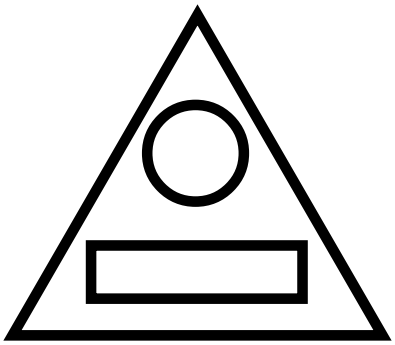
Notes and textbook references

K. The child participates appropriately in movement songs such as the "Hokey Pokey", Hap Palmer songs, and aerobic dances.

L. Student builds a design with pattern blocks behind a folder and then describes the design to partner who tries to reproduce the design from the oral directions.

M. "Fold your paper in half two times. How many boxes will you see when you unfold it? Put your name in the top right corner. Draw a star in the middle of the paper. Trace your hand in the top left hand rectangle. Draw a flower in the top right hand rectangle. In the rectangle below the flower draw a heart. Beside the heart write your favorite number. In the bottom left rectangle draw a kite. Over the kite print your favorite letter. Draw a line under your hand." *Extension:* Include other directional/positional words. Repeat the activity frequently until children can complete such a task in a center using audio-taped directional/positional words. These fun directions lead into math-related directions which children must understand in setting up problems correctly. For example, write a "+" between the 4 and the 3 or write 16 below 31 and put a "+" to the left of the 16.

3.04 Complete simple spatial visualization tasks and puzzles.



A. Spatial Visualization

Materials: a variety of materials can be used to develop spatial visualization skills including pattern blocks, geoboards, tangrams, puzzles, Relationshapes and building blocks.

Instructions: Making your own spatial visualization tasks and puzzles is easy but very time consuming. There are excellent books which are full of spatial activities and puzzles. Among the resources are : *Critical Thinking Activities K-3* (Dale Seymour) and *Pattern Block Problems for Primary People* (Cuisenaire).

B. Look/Remember

Materials: pattern blocks; cover sheets

Instructions: Sit beside the children and place no more than five pattern blocks in a row. (Sitting beside the children will prevent a mirror effect.) Children

look at the blocks for five seconds. Now cover the blocks. Children use a pool of blocks to choose the ones needed to reproduce the order of your blocks. Once they are finished, uncover your arrangement for children to check their pattern. Children may also play this game in pairs. After working with small groups of children, use the overhead for a whole class lesson.

Notes and textbook references

C. Take a Peek

Materials: overhead projector and screen; transparencies (see Blackline Masters III - 57 through III - 61); crayon and paper for each child

Instructions: Before turning on the overhead projector, place transparency on top. Tell the children that you are going to show them a picture that they need to try to remember. Turn on the overhead for about five seconds. Turn off the overhead or cover and ask the children to draw what they remember. Turn the overhead on again for them to see for another five seconds. When they have finished, show the original and compare. Ask the children to share strategies for remembering. Start with simple designs, then use more complex designs as the children become more skillful. Large coloring book pages are excellent sources for overhead pictures.

D. Geoboard Fun

Materials: one geoboard per child; geobands; overhead geoboard; overhead projector. *Optional:* geoboard dot paper

Instructions: The teacher makes a design on the overhead geoboard. Children copy the design on their geoboards. Children can take turns being the teacher.

Variation: Children may copy the design on geoboard dot paper. (Enlarge regular dot paper for first attempts.) If this task is frustrating for the children in the group, don't use it!

E. Greetings to You!

Materials: old greeting cards; ziplock bags

Instructions: Cut old greeting cards into puzzle shapes. Store each picture in a separate ziplock bag for use in centers.

Variation: Use the front panel of cereal boxes for puzzles.

Notes and textbook references

F. Stop, Look, and Identify

Instructions: Have children move around the room, finding the empty space. When the teacher calls "Stop," everyone freezes and listens for the teacher to name an attribute. Then the children move around the room and find something that has the attribute name.

Materials: clay balls or playdough

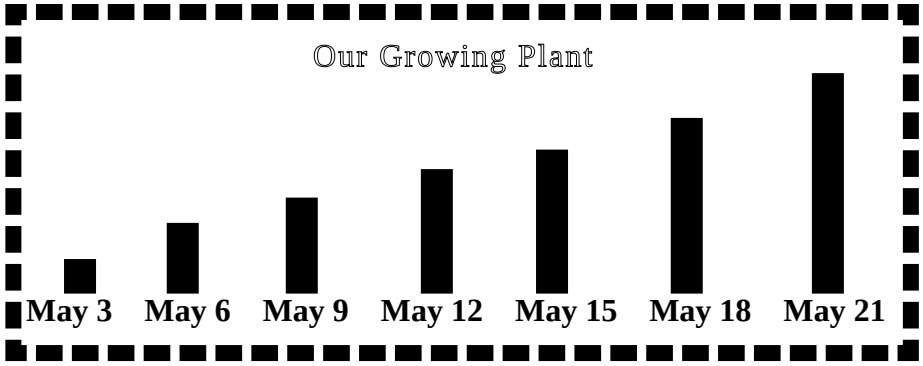
Instructions: Have children make snakes with the clay. Compare lengths (longest/shortest). Compare the thickness of the snakes. Use a balance to compare their weights. (Snakes may need to be rolled up to fit into balance pans.)

G. Our Growing Plants

Materials: seeds; containers; string; graph

Instructions: Plant seeds in two containers. Record which plant grows the fastest/slowest. Which plant is taller/shorter? Keep a growth record for each plant. Measurements of the plant may be non-standard units. For example, cut string to represent the height and graph strips.

Variation: This activity also works well with bulbs such as amaryllis.



H. Line Them Up

Children develop a better understanding of the world around them if they regularly estimate before they measure and then evaluate their estimate after they measure.

Materials: magazine pictures of people with different heights. (If possible, mount the pictures on posterboard and laminate so you can use them year after year.) ***Note:*** Be sure pictures are the same approximate scale so that a large picture of a child is not taller than a man.

Instructions: Children order picture people by height. Have each child explain their reasoning for placing the pictures using terms such as tall, taller, tallest.

Notes and textbook references

Extension: Ask the children to bring dolls or stuffed animals from home. Have them order the stuffed animals and discuss their reasons, using comparison vocabulary.

I. Size Posters

Materials: paper and crayons for each child; background paper; large size labels

Instructions: Give children different size pieces of paper and ask them to draw faces and add yarn hair. When they have finished, ask the children to help sort faces by size and affix to background paper. Label one side of the paper "Big Faces" and the other side "Little Faces."

Variation: Have children make tall/short buildings.

J. Thick or Thin

Materials: workmat (see Blackline Master II - 41) a collection of items that come in thick and thin, such as two different thicknesses of sponges, nails, blocks, rubberbands, crayons, pencils, books, shoe soles, yarn, lids, candles, dowel rods, string or rope, paper plates, bars of soap, or rug samples.

Instructions: Each student chooses an item. Say the name of an item, such as "sponge," and ask the two children with sponges to approach the workmat. Children compare their objects. After placing their objects on the correct side of the chart, children should explain their reason for identifying the object as thick or thin.

Things That Are Thick	**Things That Are** Thin

Notes and textbook references