

Geometry

In Kindergarten, children continue building their understanding of shapes. They move from using informal (e.g., shaped like a soccer goal) to more formal (e.g., a cone) language to describe and name shapes. They begin to focus on geometric attributes to identify, name, and describe basic two-dimensional shapes presented in a variety of ways (e.g., with different sizes and orientation), as well as three-dimensional shapes, such as cubes, cones, cylinders, and spheres.

Focusing on attributes enables children to move beyond their own notions of what certain shapes should look like to more mathematically refined definitions. For instance, children move from thinking that all triangles have equal-size sides and angles to understand that triangles may have varying appearances due to differences in side length, angle measures, and orientation.

Children use basic shapes and spatial reasoning to model objects in their environment and construct more complex shapes. They analyze and compare two- and three-dimensional shapes having different sizes, orientation, and attributes. They also compose simple shapes to form larger shapes. This concept develops as children manipulate shapes by moving, rotating, flipping, and arranging shapes and other objects, such as puzzles, blocks, and cut-outs, in their classroom and daily living.

The Kindergarten Common Core State Standards for Geometry specify that children should—

- Identify and describe shapes.
- Analyze, compare, create, and compose shapes.

The following hands-on activities enable children to explore shapes and begin to understand that certain attributes define what a shape is while others do not. Mathematically proficient Kindergarteners begin to clearly express, explain, organize, and consolidate their math thinking both verbally and through writing and drawing. Through opportunities that encourage exploration, discovery, and discussion, children in Kindergarten begin to learn how to express opinions, describe their reasoning, and respond to others' thinking and reasoning.

Geometry

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Objective

Identify *left* and *right*.

Common Core
State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

Geometry

Left and Right

The relative position of any object can be described using the words *right* and *left*. As with other ways of determining location, such as *inside* and *outside*, *right* and *left* require a reference point. Without something on the right, there is no left. Without something on the left, there is no right. The ability to describe location in terms of left and right is important in building geometric thinking and is especially useful in real life. Using the vocabulary of *right* and *left* will help children describe locations in space.

Try It! Perform the *Try It!* activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *How do you know which is left and which is right?* Discuss with children how they remember left and right, for example by using their left and right hands.
- **Ask:** *Can you think of some ways to remember the difference between left and right?* Discuss ways to remember left and right, such as placing the left hand palm down to form the letter *L* with the index finger and thumb.
- **Ask:** *How did you know where to put the yellow and green Color Tiles? How did you know where to put the blue and red tiles?*

Solve It

With children, reread the problem. Ask children to set a plain piece of paper in front of them. Have them use crayons or markers to draw yellow and green circles to show the paints on the left side. Then ask them to draw red and blue circles on the right side.

More Ideas

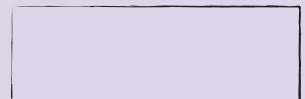
For other ways to teach about *right* and *left*—

- Ask children to separate Frog Counters into two groups. Frogs that are green should go on the left. Frogs that are red should go on the right.
- Have children use two sheets of paper and Attribute Blocks to practice following directions that involve left and right. Children should have two sheets of paper in front of them, one on the right and one on the left. Tell them to put a red triangle on the left sheet of paper, a blue rectangle on the right sheet of paper, and so on.

Formative Assessment

Have children try the following problem.

*Draw a triangle on the left side of the box.
Then draw a circle on the right side of the box.*



Try It! 20 minutes | Groups of 3

Here is a problem demonstrating *right* and *left*.

After an art project, Mr. Lewis wants the paints to be put away. He wants the green and yellow paints to be put on the left side of the drawer. He wants the red and blue paints to be put on the right side of the drawer. Can you draw how Mr. Lewis wants the paints to be put away?

Introduce the problem. Then have children do the activity to solve the problem.

Distribute Color Tiles and Attribute Sorting Circles to groups of children.

Materials

- Color Tiles (several per group with at least 1 of each color)
- Attribute Sorting Circles (2 per group)



1. Help children understand the concept of right and left by using the right and left sides of their bodies. **Say:** *Raise your right hand. Now touch your left knee with your left hand.* Make sure children are able to identify left and right correctly.



2. Say: *We can use our right hand to help us know when something is on the right side. We can use our left hand to help us know when something is on the left.* Instruct children to place one circle in front of the right of their group and one circle in front of the left of their group.



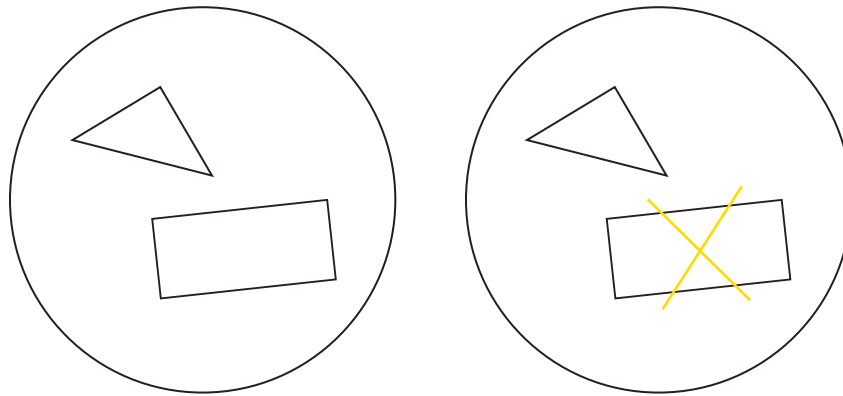
3. Invite children to place green and yellow tiles in the left circle. Remind children that this is the circle to the left of their group. Have children place red and blue tiles in the right circle. Remind them that this is the circle to the right of their group.

Look Out!

If children need extra help remembering right and left, spend some time discussing the importance of right and left in children's everyday life. Point out that we read from left to right, or that the school bus driver sits on the left side of the bus. Look around the classroom and have children practice identifying objects that are on their right or left. Also, point out to children that right/left position is relative to their position.

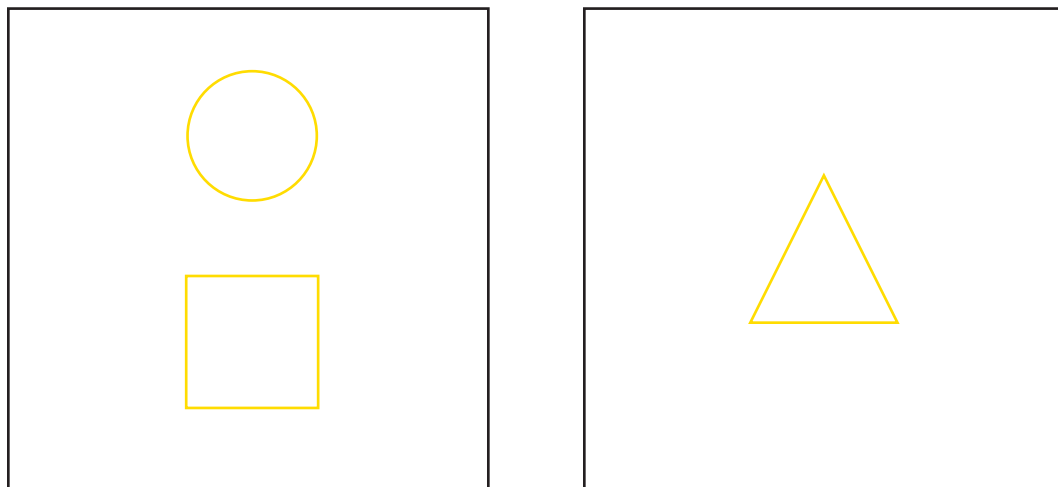


1.



Check children's work.

2.

**Directions**

1. Color the triangle in the circle on the left side. Put an X on the rectangle in the circle on the right side. 2. Draw a triangle in the box on the right. Draw a circle in the box on the left. Draw a square in the box on the left.

Answer Key

Check children's work.

Challenge

Draw three shapes on the left side of your paper. Color these shapes on the left blue. Draw two shapes on the right side of your paper. Color these shapes on the right red.

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Objective

Identify the positions *top*, *middle*, and *bottom*.

Common Core State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

Geometry

Top, Middle, and Bottom

As children become familiar with location, they develop spatial reasoning. This lays a foundation for beginning navigational skills. Understanding the positioning of objects allows children to begin to create mental maps, which is a life skill. In this lesson, children will use the words *top*, *middle*, and *bottom* to describe the location of Snap Cubes®.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Say:** Look at the stack of cubes on your desk. **Ask:** Which cube is on top of the stack? How can you remember where the top is?
- **Ask:** Which cube is in the middle? How can you remember where the middle is?
- **Ask:** Which cube is on the bottom? **Say:** Name some ways you can remember where the bottom is.
- Point out the difference between *top*, *middle*, and *bottom* and *first*, *second*, and *third*. Stress that *top*, *middle*, and *bottom* are used only to indicate vertical order, whereas *first*, *second*, and *third* may describe either vertical or ordinal position.

Solve It

With the children, reread the problem. Invite children to draw a bookshelf with three shelves. Ask them to use markers or crayons to draw the red block on top, the blue block in the middle, and the green block on the bottom.

More Ideas

For other ways to teach about the positions *top*, *middle*, and *bottom*—

- Invite children to make stacks of three different Pattern Blocks shapes and identify which block shapes are in the positions *top*, *middle*, and *bottom*.
- Have children work in pairs using the “bookshelves” they drew and Three Bear Family® Counters to further explore the concepts of top, middle, and bottom. One child places one or more bears on the top shelf, one or more in the middle, and one or more on the bottom. The other child identifies which bear or bears are in each position. Children take turns arranging the bears and naming their positions.

Formative Assessment

Have children try the following problem.

Circle the cube that is in the middle. Then place an X on the cube that is on the bottom.



Try It! 15 minutes | Pairs

Here is a problem demonstrating *top*, *middle*, and *bottom*.

Ms. Diaz's class has a bookshelf with three shelves. Ms. Diaz asked Theresa to place a red block on the top shelf, a blue block on the middle shelf, and a green block on the bottom shelf. Can you draw a picture of the blocks on the bookshelf?

Introduce the problem. Then have children do the activity to solve the problem.

Pass out Snap Cubes to children.

Materials

- Snap Cubes® (1 blue, 1 red, and 1 green per pair)



1. Direct children to look around the classroom. Point out objects that are on top of other objects. Instruct pairs of children to set the blue cube in front of them on the desk or table.



2. Now tell children to put the red cube on top of the blue cube. **Say:** *The red cube is on top. The blue cube is on the bottom.*



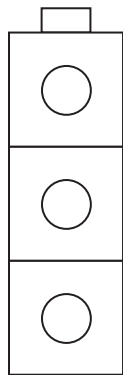
3. Tell children to put a green cube on the bottom of the stack. **Say:** *The blue cube was on the bottom before. Now the green cube is on the bottom. The blue cube is in the middle.* Practice the concept of top, middle, and bottom by instructing children to build more three-cube towers.

! Look Out!

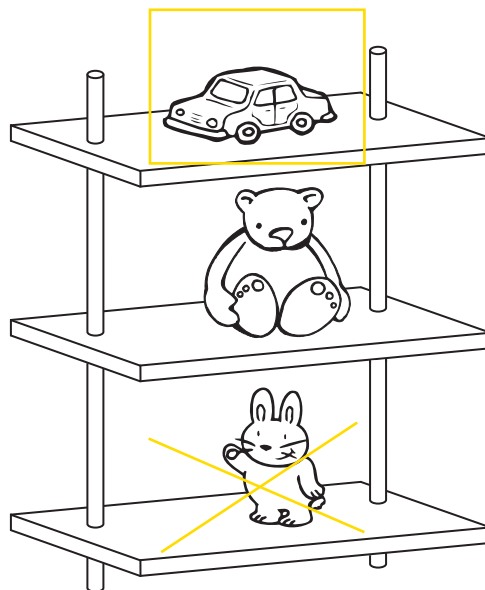
Watch for children who might automatically assume that the first color cube mentioned is the one that goes on the top. Try mixing up the way you state the positioning by starting with the bottom cubes some of the time. Also, be sure that children do not confuse the positions *top*, *middle*, and *bottom* with ordinal numbers such as *first*, *second*, and *third*.

Check children's work.

1.



2.



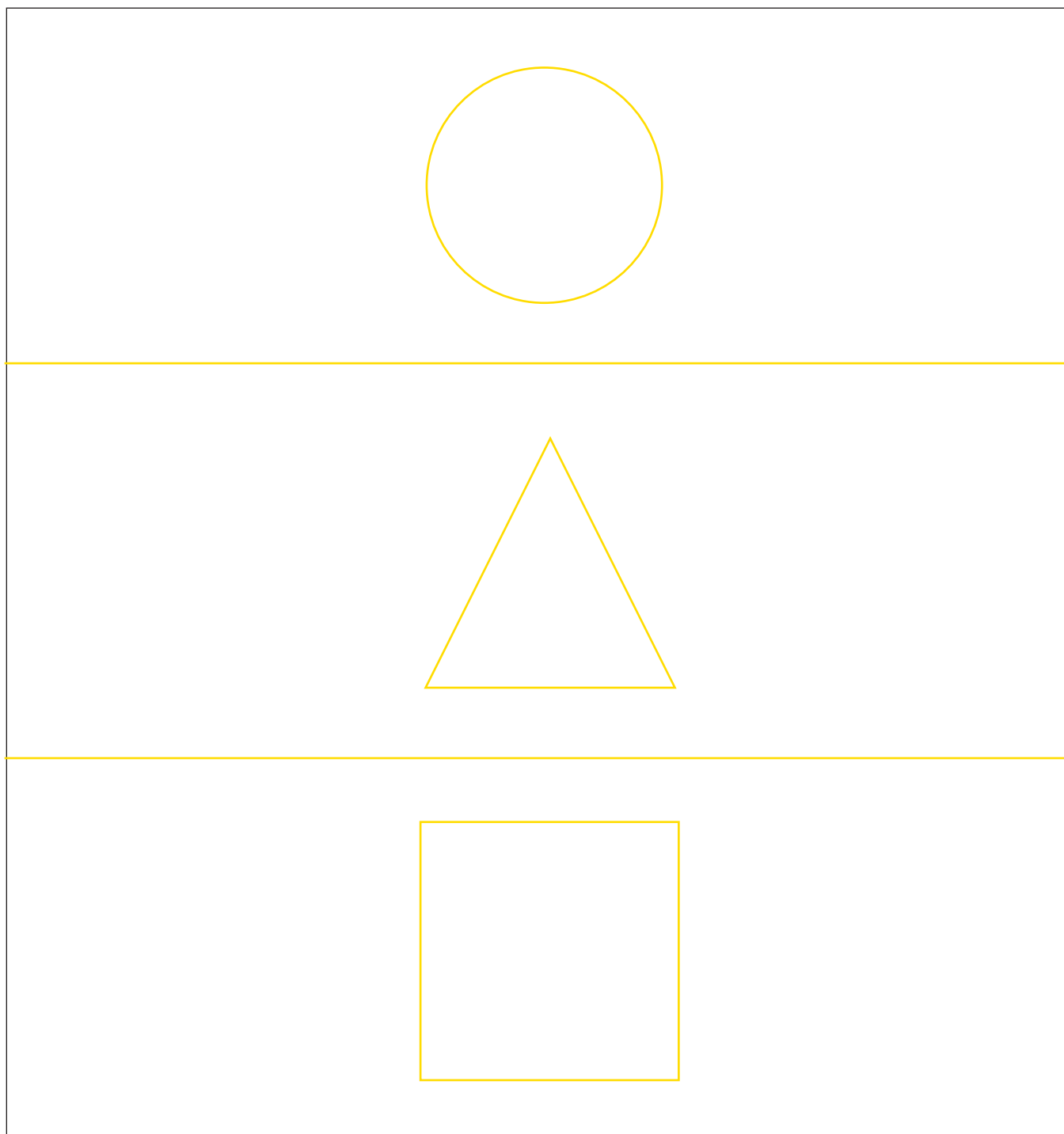
Directions

1. Color the cube in the middle green. Color the cube on the bottom red. Draw a square on the top shelf.
2. Draw an X on the bottom shelf.



Answer Key

Check children's work.



Challenge

Draw a straight line across your paper two times to make three spaces. Draw a triangle in the middle space. Draw a circle in the top space. Draw a square in the bottom space.

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Objective

Identify the positions *in front*, *behind*, and *between*.

Common Core State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

Geometry

Positions in a Line

In our daily lives, we are often confronted with situations requiring directional skills. As children become familiar with location, they develop spatial reasoning. This lays a foundation for beginning navigational skills. In this lesson, children will use the words *in front*, *behind*, and *between* as they place 1" Color Cubes in a line.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** Which color is at the front of the line? Which color is behind the cube at the front of the line? **Say:** This cube is behind one cube and in front of another. **Ask:** What do we call this place in a line? Discuss with children what it means to be between two objects. Point out that another way to say that an object is between two other objects is to say that it is in the middle.
- **Ask:** Which color is behind the cube in the middle?
- **Say:** Suppose you added a purple cube to the front of your line. **Ask:** What colors would be behind the purple cube?

Solve It

With children, reread the problem. Have children solve the problem by using markers or crayons to draw the order of the teams on a piece of paper. Children may draw circles or simple stick figures in green, blue, and orange to show the correct order.

More Ideas

For other ways to teach about *in front*, *behind*, and *between*—

- Allow children to come up with their own color order using Three Bear Family® Counters. Children should set the bears in a line with their faces turned the same way. Then they can turn the bears around to see how the order changes. Have them draw pictures to show the different positions in which they place the bears.
- To tie geometry in with number sense, have children use the directional words *in front*, *behind*, and *between* when describing the location of Pattern Blocks on a 0–10 Number Line (BLM 1), showing left to right directionality.

Formative Assessment

Have children try the following problem.

Which fish is between the yellow fish and the blue fish? Circle the answer.



Try It! 15 minutes | Groups of 3

Here is a problem demonstrating positions in a line.

Mr. Williams divided his class up into teams to play a game. He told the green team to stand up in front. He told the orange team to line up behind the green team. Next, he told the blue team to stand in front of the orange team. What is the order of the teams?

Introduce the problem. Then have children do the activity to solve the problem.

Distribute 1" Color Cubes to groups of three children, one cube per child. Each child in the group should get a different color.

Materials

- 1" Color Cubes (1 green, 1 orange, and 1 blue cube per group)



1. Each child in the group should stand up, holding his or her cube. **Say:** *The people with green cubes step away from your group and start a line. I'd like the people with orange cubes to stand behind the people with green cubes. Next, people with blue cubes should stand between the people with green and orange cubes.*



3. Have children mix up cubes, and then give them instructions to put cubes in a different order. Complete the activity two or three more times with other sets of directions.



2. Once all children are in a row, have them set down their cubes in the order that matches how they are standing. Groups may compare their orders.

Look Out!

If children have trouble following multistep directions, review the meaning of *in front*, *behind*, and *between* by asking children to perform only one step. Also, children might use the ordinal words *first*, *second*, and *third* to describe the positions in line. While these terms are correct, you will want to make sure that children are also learning the spatial terms *in front*, *behind*, and *between*. Additionally, make sure children understand that left-to-right order is not necessarily the same as front-to-back. The object farthest left in a line is not automatically at the front, because the location of the front of the line depends on which way objects are facing.

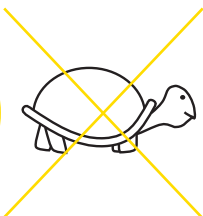
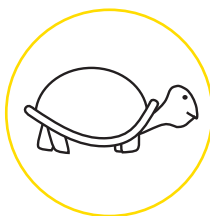


Check children's work.

1.



2.



Directions

1. Color the bird in front red. Color the bird between the others blue. 2. Draw an X on the turtle between the others. Circle the turtle behind the others.



Answer Key

Check children's work.

Challenge

Draw three fish in a line. Color the fish behind green. Color the fish in front brown. Color the fish between the others orange.

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Objective

Identify the positions *on*, *above*, and *below*.

Common Core State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

Geometry

Relative Locations

We use relative positioning throughout our daily lives to form mental images. When working with graphs, charts, grids, and other visual aids, words describing relative position are vital in making interpretations. In this lesson, children will use *on*, *above*, and *below* to determine location. They will do this by placing 1" Color Cubes on, above, and below their chairs.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** Which cube is below the red cube? How can you remember where below is? List ideas that children come up with.
- **Ask:** Which cube is above the yellow cube? Make sure children understand that when something is *above* an object, it is in a place over the object. Have them come up with some ways to remember where *above* is.
- Discuss the fact that all three cubes are *on* a surface. Make sure that children see that the green cube is on the floor, the yellow cube is on the chair, and the red cube is on the desk.

Solve It

With children, reread the problem. Pass out a piece of paper to each child. As you read the problem again, have children use markers or crayons to draw how Melissa put the objects away. They can draw the table and the objects, or use yellow, red, and green circles to represent the objects and their relative positions.

More Ideas

For other ways to teach about *on*, *above*, and *below*—

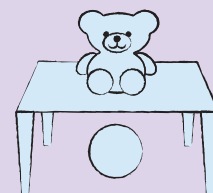
- Have children practice using the words *on*, *above*, and *below* by placing Frog Counters on, above, or below a table or desk and then describing their locations. For example, "The purple frog is above the blue frog."
- Have children use Attribute Blocks to practice *on*, *above*, and *below*. Tell them to put a red shape with three sides below their chair. Then have children put a blue shape with four sides on their chair. Continue with other shapes.

Formative Assessment

Have children try the following problem.

Circle the toy that is on the table.

Put an X on the toy below the table.



Try It! 10 minutes | Independent

Here is a problem demonstrating relative locations.

Mrs. Lane asked Melissa to put away a few of her things. She told Melissa to put her green boots below the table. She said to put her yellow book on the table. Then she said to put the red picture she made on the wall above the table. Where did Melissa put these things?

Introduce the problem. Then have children do the activity to solve the problem.

Pass out one red, one yellow, and one green 1" Color Cube to each child. **Say:** *Today we are going to use these cubes to learn words that tell where things are.*

Materials

- 1" Color Cubes (1 red, 1 yellow, and 1 green cube per child)



1. Have children stand up and hold their three cubes. Have children put their yellow cube on their chair. **Say:** *Point to the cube on the chair.* Make sure children point to the yellow cube.



2. Have children put the red cube on their desk. **Say:** *Point to the cube that is above the yellow cube.* Make sure children point to the red cube.

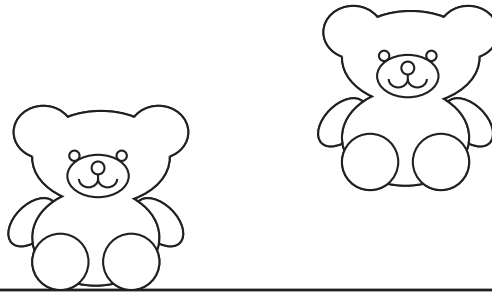


3. Have children put the green cube on the floor under the chair. **Say:** *Point to the cube that is below the yellow cube.* Make sure children point to the green cube.

! Look Out!

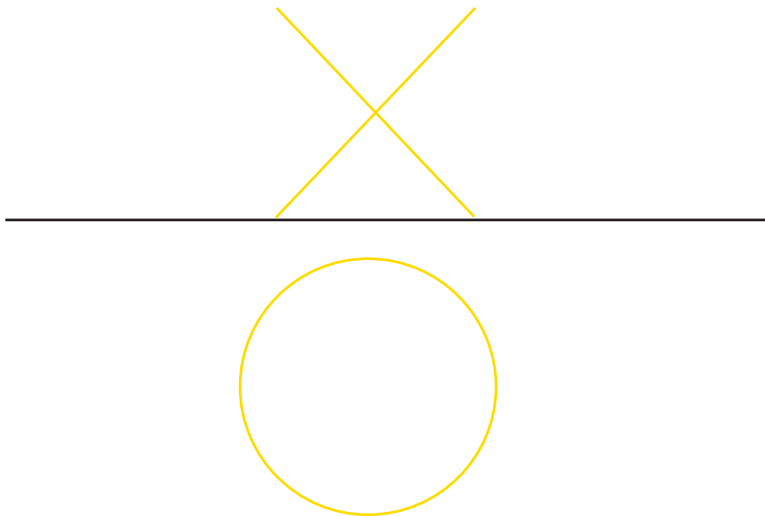
Some children may get confused using the term *on* when describing location and think that if an object is next to something, it is on it. Emphasize the difference between the meanings of *on* and *next to*. Make clear to children that just because an object is close to something, it is not necessarily on it. Remind children that when using the words *on*, *above*, and *below*, we are describing the location of things that go up and down.

1.



Check children's work.

2.

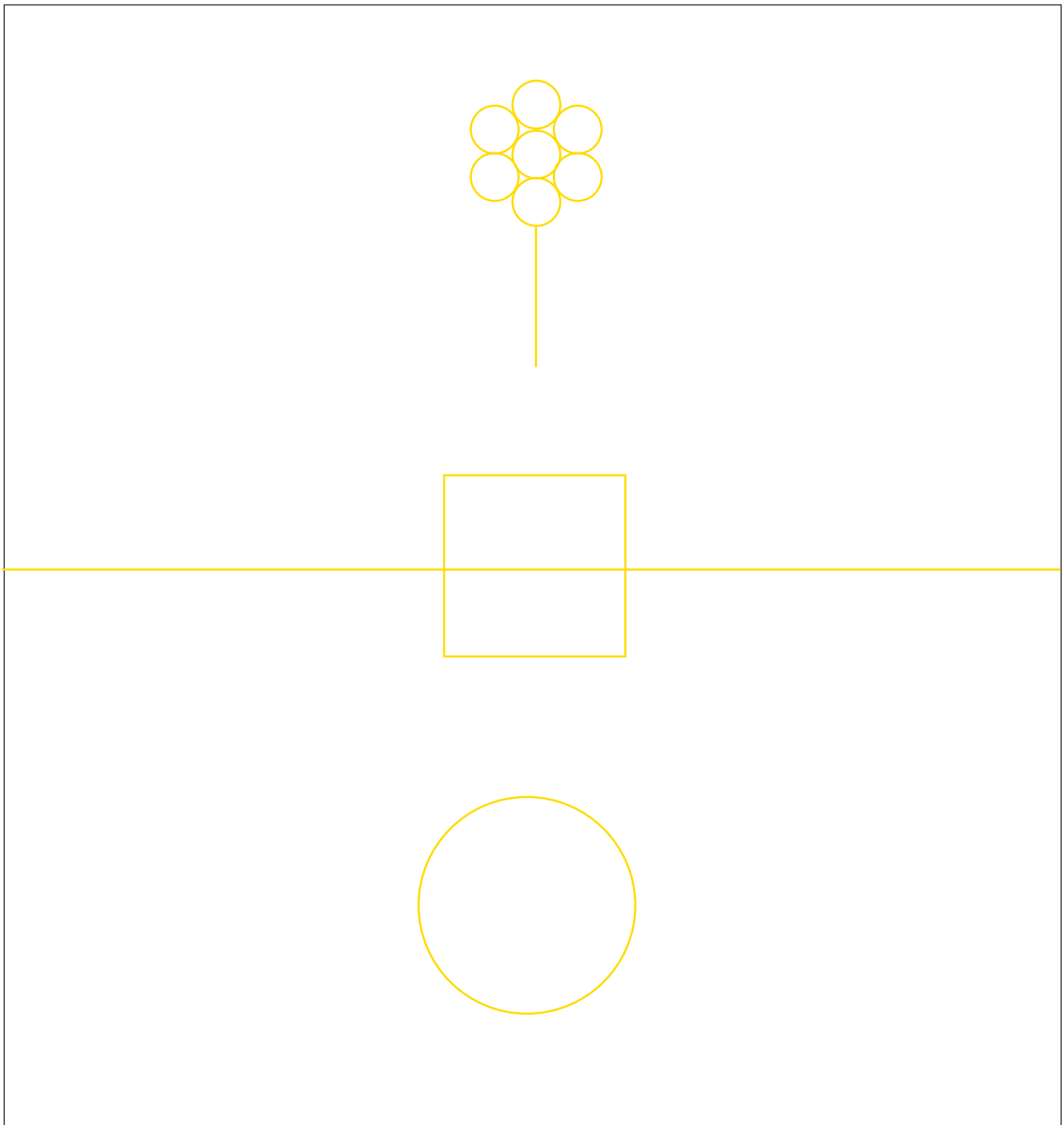
**Directions**

1. Color the bear above the line red. Color the bear on the line yellow. 2. Draw an X on the line. Draw a circle below the line.



Answer Key

Check children's work.



Challenge

Draw a straight line across your paper. Draw a circle below the line. Draw a flower above the line. Draw a square on the line.

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Objective

Identify the positions *inside* and *outside*.

Common Core State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

Geometry

Inside and Outside

The position of any object can be described as *inside* or *outside* a given location. An object is *inside* a location if it is within the boundaries of the location. An object is *outside* a location if it is not within the boundaries of the location. Identifying the position of an object in three-dimensional space is one of the most basic descriptive steps in geometric thinking. This skill sets the stage for identifying locations such as over, under, and on. Later, this skill will help children understand measurements such as length and area.

Try It! Perform the *Try It!* activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *How are inside and outside different?*
- **Ask:** *Where is inside the circle? Where is outside the circle?*
- **Ask:** *Which shapes did you put inside the circle? Which shapes did you put outside the circle?* Encourage children to use the names of the shapes.
- If a child places an Attribute Blocks shape on the circle, point out that part of the block is inside, and part of it is outside. Also, remind children that they can use other positional words to describe where one block is in relation to other blocks.

Solve It

With children, reread the problem. Ask children to draw a circle to show the basket in the problem. Then have them draw where the ball could have landed in order for Kevin to score 1 point.

More Ideas

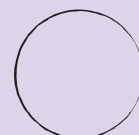
For other ways to teach about *inside* and *outside*—

- Have children draw shapes on sheets of paper and place Snap Cubes® inside or outside the shape.
- Have children describe the location of Three Bear Family® Counters that are inside and outside a cup.
- Have pairs of children place Attribute Blocks inside and outside Sorting Circles based on their attributes. For example, have pairs put shapes with four corners outside the Sorting Circle and shapes with three corners inside it.

Formative Assessment

Have children try the following problem.

Draw a square inside the circle. Then draw a triangle outside the circle.



Try It!

30 minutes | Pairs

Here is a problem demonstrating the positions *inside* and *outside*.

At recess, Mrs. Miller introduced the children to a new game called Ball Toss. If a ball lands inside the basket, you score 1 point. If a ball lands outside the basket, you score 0 points. When Kevin threw the ball, he scored 1 point. Where did the ball land?

Introduce the problem. Then have children do the activity to solve the problem.

Distribute Attribute Blocks and Attribute Sorting Circles to pairs. Tell children that they will be learning about the words *inside* and *outside*.

Materials

- Attribute Blocks
- Attribute Sorting Circles (1 per pair)



1. Direct children to look around the classroom and notice things that are inside or outside of other things. You may want to hold up a container of blocks and tell children that the blocks are inside the container. Next, take out a block and tell children that this block is outside the container.



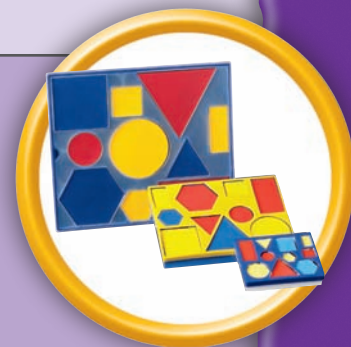
2. Have pairs place a Sorting Circle in front of them. Tell children that objects also can be inside or outside a flat circle. Demonstrate by placing a block triangle inside a Sorting Circle. **Say:** *The triangle is inside the circle.* Demonstrate putting a block outside the circle as well. Then invite one child in each pair to take a block and place it on the desk either inside or outside of the circle.



3. The other child will describe the location of the block using the word *inside* or *outside*. Invite children to take turns setting down the blocks and telling where they are placed. Encourage children to use the correct vocabulary for the shapes they are using.

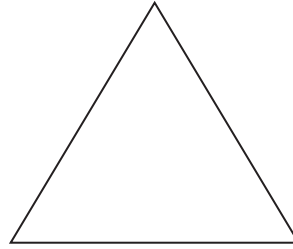
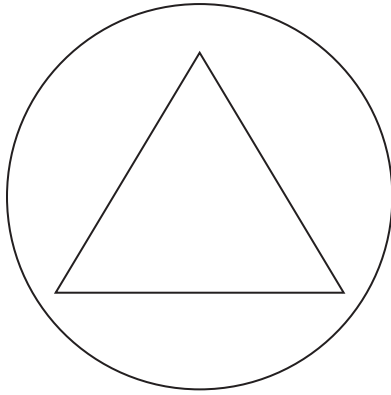
Look Out!

Watch for children who confuse the words *inside* and *outside* because they sound alike. Remind children that they go outside the school for recess and come back inside the school when recess is over. Connect this idea to the activity by using counters. Have children move the counters outside the Sorting Circle for "recess." Then have children return the counters to the circle.

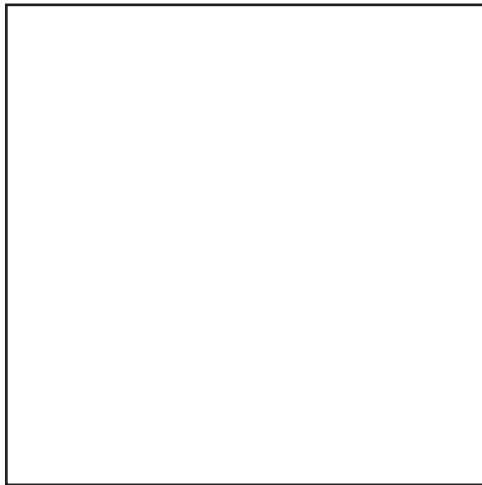


Check children's work.

1.



2.



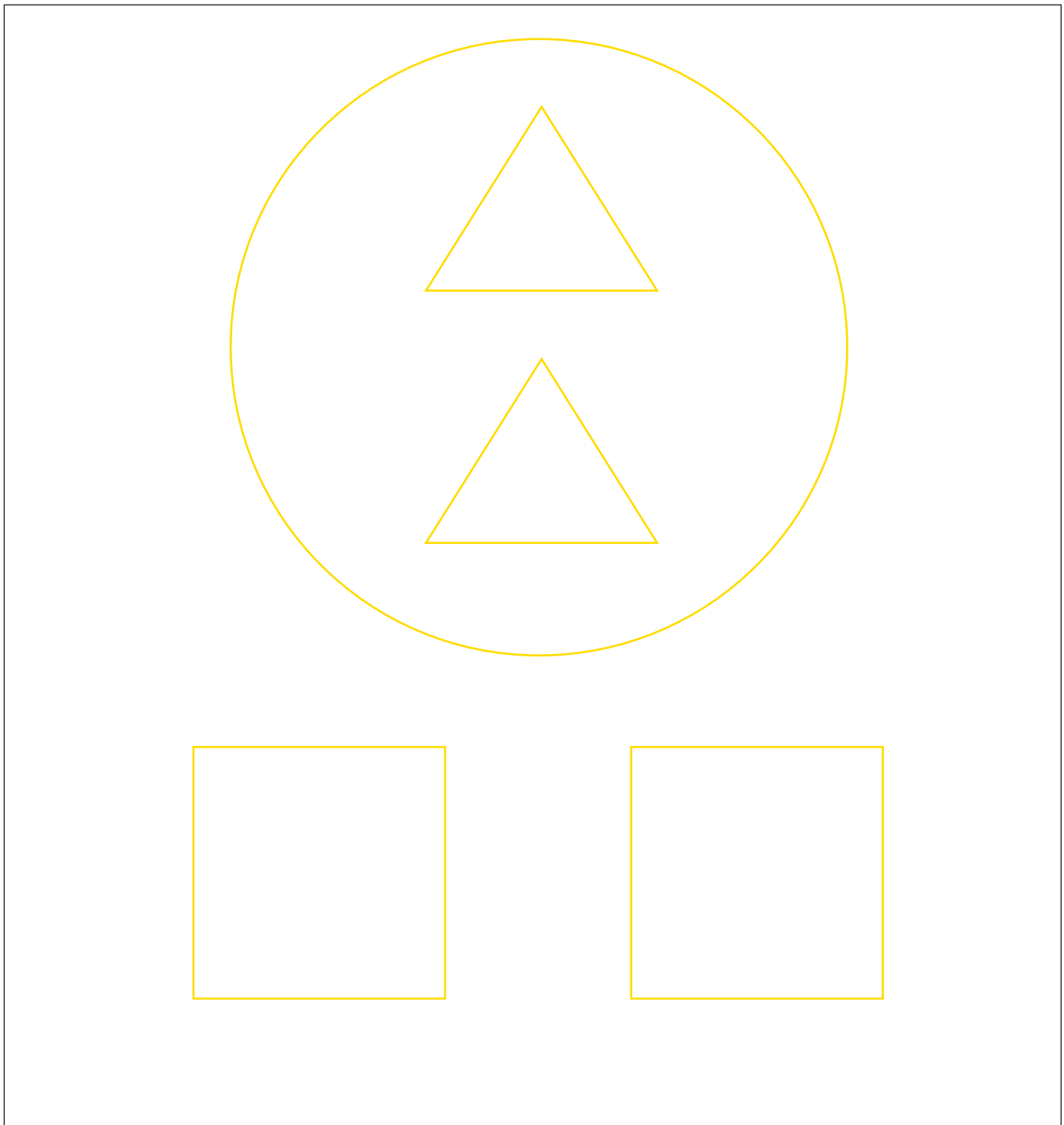
Directions

1. Color the shape outside the circle blue. Color the shape inside the circle yellow. 2. Draw a heart inside the box. Draw a fish outside the box.



Answer Key

Check children's work.



Challenge

Draw a large circle. Draw two squares outside the circle. Draw two triangles inside the circle.

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Objective

Use language such as *before* or *after* to describe relative position in a sequence of events or objects.

Common Core State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

Geometry

Before and After

Relative position is one way to describe the location of an object or the place in time of an event by relating it to another. Words such as *next to*, *in back of*, *in front of*, etc. describe relative position. When sequencing objects or events in a line, the objects can be described in relation to others with words such as *before*, meaning in front of, and *after*, meaning behind.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- Have children look at completed trays and compare to other children's trays.
- **Ask:** *Where did you put the dog? Where did you put the car? Where did you put the house?*
- **Say:** *Look at your tray. Look at another group's tray.*
- **Ask:** *Is the house in front of the car? Is the dog in back of the house?*

Solve It

With children, reread the problem. Then have the class form a line. Ask children to state the name of the person who is in line before them and name the person in line after them. Have them change their order several times and repeat the activity.

More Ideas

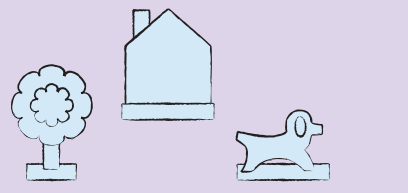
For other ways to teach about *before* and *after*—

- Have children practice *in back of* and *in front of* by lining up 3 different Frog Counters and pointing to each as they describe their location. Then have them line up the counters side-by-side and describe which counter is next to the one the child is pointing to.
- Have children make patterns of Color Tiles or Pattern Blocks. Ask children to describe the sequence of objects using *before* and *after*.

Formative Assessment

Have children complete the following activity.

Make a line with a tree, a house, and a dog. Put the tree before the house. Put the dog before the tree. Explain how you know that your line is correct.



Try It! 30 minutes | Pairs

Here is a problem about relative position.

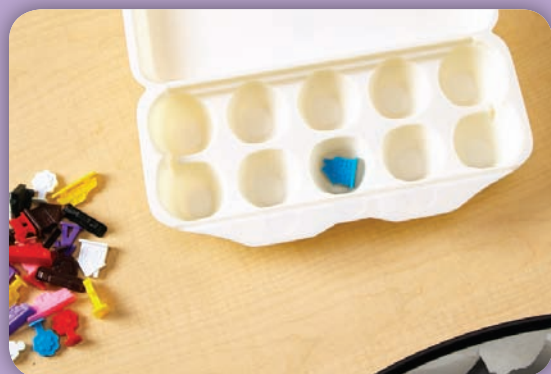
Grace wants to arrange her toys in a line. She wants her car to be before the house, and the dog to be after the house. How should Grace line up her toys?

Introduce the problem. Then have children do the activity to solve the problem.

Say: *Let's follow the steps below to show Grace how to line up her toys.* Distribute materials to children.

Materials

- CounTEN® Sorting Tray (1 per pair)
- Classifying Counters (1 house, 1 dog, and 1 car per pair)



1. To begin, ask children to put a house counter in a slot near the middle of the tray.



2. Have children place a car counter before the house. Explain to the children that *before* means "in front of."



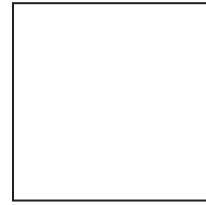
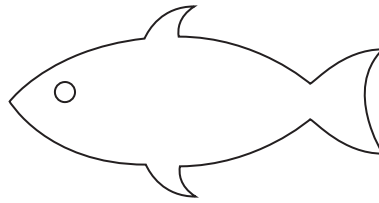
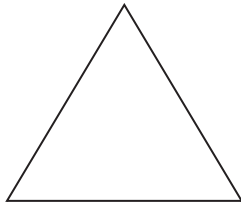
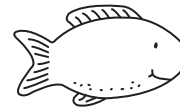
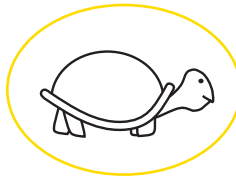
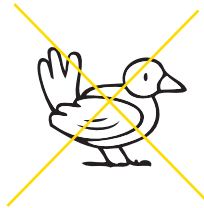
3. Now have the children place a dog counter in the slot after the house. Explain to the children that *after* means "behind."

Look Out!

Watch for children who try to arrange the objects from side to side. Unless there is established prior knowledge of left to right directionality, there is no way of knowing whether or not children understand before and after.



Check children's work.

Answer Key**1.****2.****Directions**

1. Color the shape before the fish orange. Color the shape after the fish purple. **2.** Circle the animal after the bird. Draw an X on the animal before the turtle.



Answer Key

Check children's work.

Challenge

Use Classifying Counters. Make a line with a dog, a child, and a car. Put the child after the dog. Put the car before the dog. Draw your counters in the order you put them.

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Objective

Identify circles, squares, rectangles, and triangles and compare them to real-life objects.

Common Core State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.
- **K.G.2** Correctly name shapes regardless of their orientations or overall size.
- **K.G.3** Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).
- **K.G.5** Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

Geometry

Plane Shapes and Real-Life Objects

Recognition of basic plane shapes is a fundamental geometry skill. The ability to identify circles, squares, triangles, and rectangles and to compare them to real-life objects helps children to become more familiar with the specific attributes of a variety of plane shapes.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *How is a roll of tape the same as a circle? Different from a circle?*
- **Say:** *Explain how you know whether or not the things you see are shaped like a circle, square, rectangle, or triangle.*
- **Ask:** *What things are shaped like a circle? Like a square? Like a rectangle? Like a triangle? Can you draw a picture of the shapes?*

Solve It

With children, reread the problem. Give each child four blank sheets of paper and crayons. Have children draw one real-life object for each plane shape.

More Ideas

For other ways to teach about plane shapes—

- Give each pair of children four Attribute Blocks (circle, square, triangle, and rectangle) and an assortment of pictures of real-life objects that are shaped like plane shapes. Have children compare the block shapes to the pictures. Have them identify the real-life objects that are shaped like plane shapes. Then have children sort the pictures and pile them under the matching block shapes.
- Use Attribute Blocks to play a guessing game with children. Hold up a block shape and give children clues about a real-life object in the classroom and have them identify the object. For example, hold up a block rectangle and **say:** *I am shaped like a rectangle and I have pages that you can read. What am I?* (a book)

Formative Assessment

Have children try the following problem.

Color the picture that looks like a circle red. Color the picture that looks like a square yellow. Color the picture that looks like a rectangle green.



Try It! 30 minutes | Groups of 4

Here is a problem about plane shapes and real-life objects.

As Amanda looked around her classroom, she wondered . . . What things that we see are shaped like circles? What things that we see are shaped like squares? What things that we see are shaped like rectangles? What things that we see are shaped like triangles?

Introduce the problem. Then have children do the activity to solve the problem. First, look around the classroom to make sure that there are a variety of objects shaped like circles, squares, triangles, and rectangles. If there are not, then either draw a variety of simple objects on the board or cut pictures of real-life objects out of a magazine or newspaper to display to children. Then distribute Attribute Blocks and Attribute Sorting Circles to each group.

Materials

- Attribute Blocks (2 or 3 of each shape—circle, square, rectangle, and triangle—per group)
- Attribute Sorting Circles (2 per group)



1. Make sure that there is a roll of tape or other common real-life circular-shaped object in the classroom. Have children look at the roll of tape. Then encourage children to examine their blocks. **Ask:** *What shape does a roll of tape look like?* (a circle) Then have children compare the block circle to the roll of tape.



2. Point to a classroom object shaped like a square. Have children find the matching block and compare the block to the object. Have children decide which Sorting Circle is for circles and which is for squares and place blocks to represent objects in the appropriate Sorting Circles. Encourage children to find additional examples of circle- and square-shaped real-life objects. Then have children clear their Sorting Circles.



3. Repeat the activity for rectangles and triangles. Have children find examples of rectangle- and triangle-shaped real-life objects, compare them to the block shapes, and sort the blocks into two Sorting Circles.

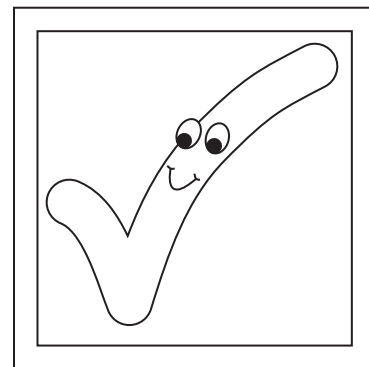
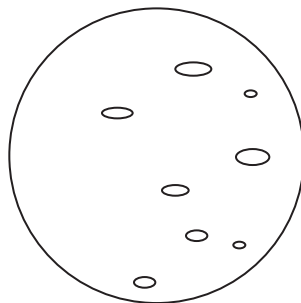
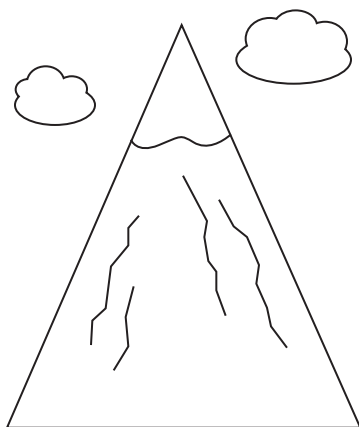
Look Out!

Watch for children who are having a difficult time seeing plane shapes in three-dimensional objects. Ask children questions about number of sides, number of corners, and length of sides. Help children to recognize that although an object is much larger or smaller than the block plane shape, it can still have a similar shape.

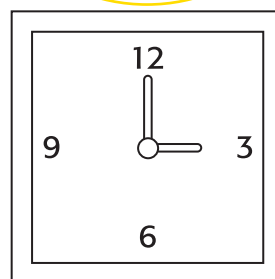
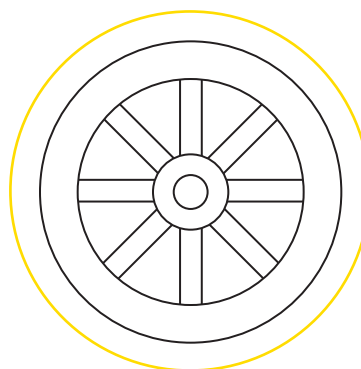
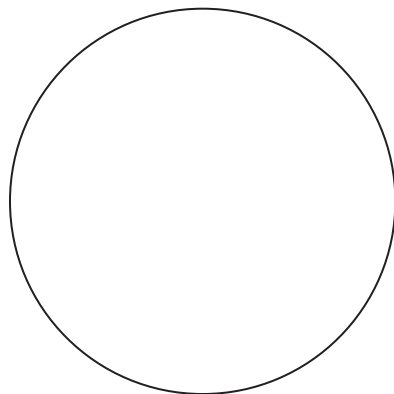


Check children's work.

1.



2.

**Directions**

1. Color the picture that looks like a circle yellow. Color the picture that looks like a square red. Color the picture that looks like a triangle green. 2. Which picture looks like the shape? Circle it.



Answer Key

Check children's work.

Challenge

Draw a rectangle. Find something in the room that looks like a rectangle and draw it.

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Objective

Identify and use shapes to create pictures.

Common Core State Standards

- **K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.
- **K.G.5** Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

Geometry

Geometric Pictures and Designs

Combining shapes to form pictures and designs can help children gain a better understanding of geometric relationships. In this lesson, children will use Attribute Blocks to create pictures and abstract designs. As they become familiar with the shapes and talk about their designs, they will begin to develop spatial reasoning.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *What are some shapes you see in the picture?* Make sure that children are able to identify square, rectangle, triangle, and circle.
- **Ask:** *How many squares are there in the picture? How many triangles?* Repeat for circles and rectangles. Give children time to find all the shapes.
- **Ask:** *Can you think of some other pictures you could make with these shapes? Could you make a boat? Could you make an ice cream cone?* Allow children to experiment with the shapes to help them imagine what pictures could be created.

Solve It

With children, reread the problem. Ask children to think about what shapes Ben might have used to make a picture of a house. Have them draw a house using any or all of the four shapes Ben's class used. Then have children color their houses. Discuss with children what shapes they used and how they chose the shapes.

More Ideas

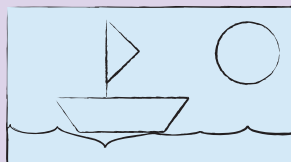
For other ways to teach about identifying and using shapes—

- Have children draw pictures of things that interest them. Then have them trade pictures with a partner. The partner should pick out any Attribute Blocks or Pattern Blocks shapes that he or she can find in the picture.
- Ask children to make pictures using Attribute Blocks. Ask them to share their pictures with other members of the class. Children should name the shapes they used.

Formative Assessment

Have children try the following problem.

Color the triangle in the picture red. Then color the circle in the picture yellow.



Try It!

15 minutes | Independent

Here is a problem about geometric pictures and designs.

Mr. Jones's class is making Attribute Blocks pictures. The shapes they are using are squares, circles, rectangles, and triangles. Ben would like to make a picture of a house. What blocks could Ben use to make his picture?

Introduce the problem. Then have children do the activity to solve the problem.

Distribute blocks and Shape Landscape (BLM 7) to each child.

Materials

- Attribute Blocks (an assortment of same-size squares, circles, rectangles, and triangles per child)
- Shape Landscape (BLM 7; 1 per child)



1. Encourage children to explore the blocks. Review names of the block shapes with which children are familiar (circle, square, rectangle, and triangle). Ask children to look at the picture. Ask them to describe what things they see in the picture, such as a house, a tree, and so on.



2. Ask children to look for block shapes in the picture. When they find a shape, have them identify it by name. Encourage children to describe the block shapes and the shapes in the picture by number of sides and corners. Have children color the shapes they find.



3. Have volunteers name all of the shapes they have found and hold up the corresponding blocks.

! Look Out!

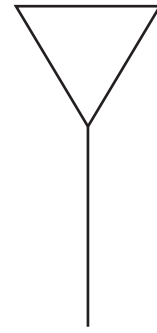
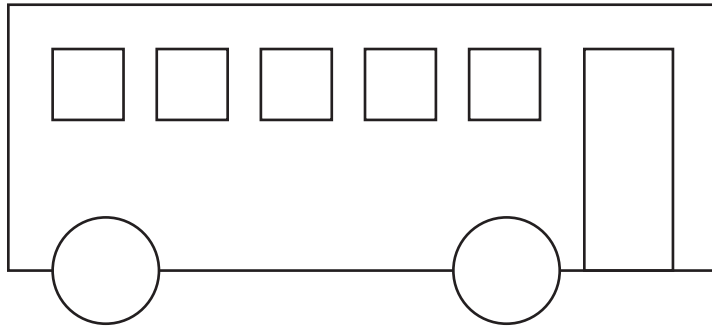
If children have trouble finding shapes in the picture, hold up individual blocks and have children review each shape's attributes. For example, remind children that a square has four sides that are all the same length. Then ask them if they can find a shape in the picture that has four sides that are all the same length.



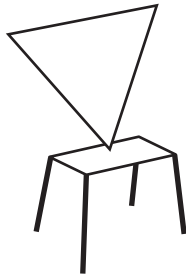
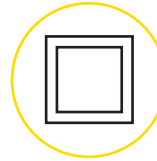
Check children's work.

Answer Key

1.



2.

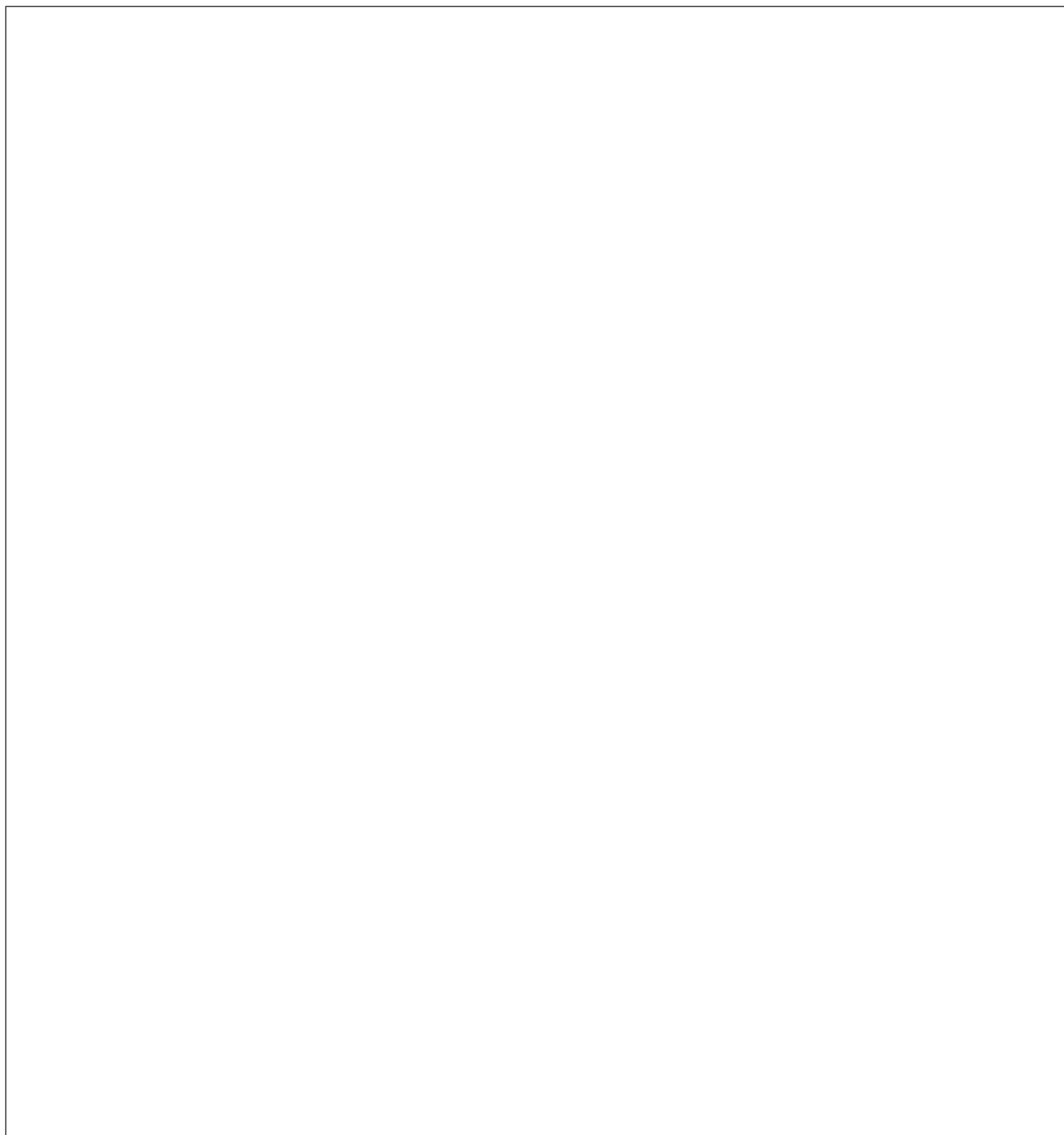
**Directions**

1. Color the triangle in the picture yellow. 2. Circle the square in the picture.



Answer Key

Check children's work.



Challenge

Use Attribute Blocks. Draw a picture that includes three or more different shapes. Color circles yellow. Color squares blue. Color triangles green. Color rectangles red.

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Objective

Explore attributes of plane shapes.

Common Core State Standards

- **K.G.2** Correctly name shapes regardless of their orientations or overall size.
- **K.G.4** Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

Geometry

Attributes of Plane Shapes

Each plane shape has attributes that make it unique and recognizable. A *square* has four equal sides and four right angles. A *rectangle* also has four sides. However, a rectangle has two opposite sides that are long and two opposite sides that are short. A *triangle* has three sides and three corners. A *circle* is a plane shape that has no sides or corners. Size and color are also attributes. Learning the basic attributes of plane shapes introduces children to shape and attribute vocabulary and prepares children for more advanced skills in geometry and algebra, such as sorting and classifying.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- Hold up a square. **Ask:** *What shape is this? How many sides does it have? How many corners does it have?*
- Hold up a rectangle. **Ask:** *What shape is this? How many sides does it have? How many corners? Is it the same as the first shape, or is it different?*
- Hold up a triangle. **Ask:** *What shape is this? How many sides does it have? How many corners?*
- Hold up a circle. **Ask:** *What shape is this? How many sides does it have? How many corners?*

Solve It

With children, reread the problem. Have children draw the shapes that Nicky and Louisa drew on a piece of paper. Have them write the number of sides each shape has next to the shape. Ask children what shapes they have drawn. Discuss with children how they can tell that the shapes are different.

More Ideas

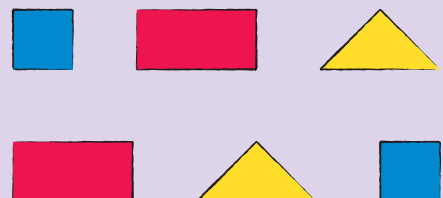
For other ways to teach about the attributes of plane shapes—

- Have children sort Pattern Blocks by color, number of sides, or number of corners. Ask them to identify the shapes they know.
- Have children work in pairs with Attribute Blocks to describe how two shapes are alike and how they are different. For example, give a pair of children a red square and a yellow rectangle and have them tell two ways the shapes are the same and two ways the shapes are different.

Formative Assessment

Have children try the following problem.

Draw a line from one shape to the shape that matches it.



Try It!

40 minutes | Groups of 3

Here is a problem demonstrating attributes of plane shapes.

Nicky and Louisa are drawing shapes on the board. Nicky draws a shape that has four sides. All the sides are the same length. Louisa draws a shape that has three sides. What shapes did Nicky and Louisa draw? Are the shapes the same or different? How can you tell?

Introduce the problem. Then have children do the activity to solve the problem.

Distribute bags filled with several matching pairs of Attribute Blocks to each group.

Materials

- Attribute Blocks (several squares, rectangles, triangles, and circles per group)
- paper grocery bags or pillow cases (1 per group)



1. Have children close their eyes, reach into the bag, and pull out a block. Children should say the name of the shape they chose and note how many sides and corners it has.



2. Next, children should reach into the bag and try to find a shape that matches the first block they chose. Have children count to make sure that the two blocks have the same number of sides and corners. **Ask:** *Are the two shapes the same?*



3. Finally, have children put their shapes back in the bag and pick out two new blocks that are different from each other. They should count the number of sides and corners and name the shapes.

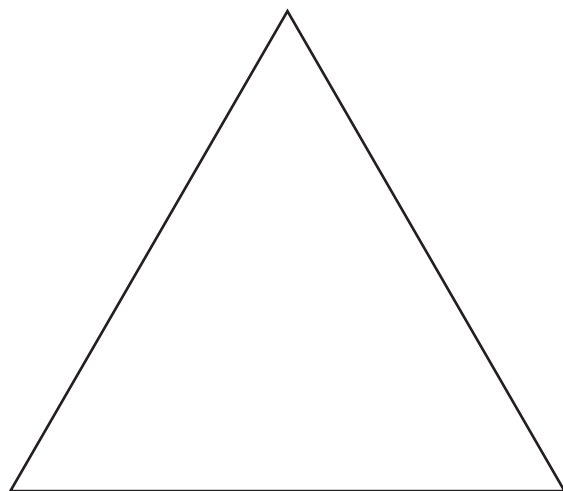
! Look Out!

Some children may confuse the shapes, especially the rectangle and the square. If this happens, show a square and talk about how all sides are the same. Then lay the square on top of a rectangle and point out that the rectangle has two long sides and two short sides.



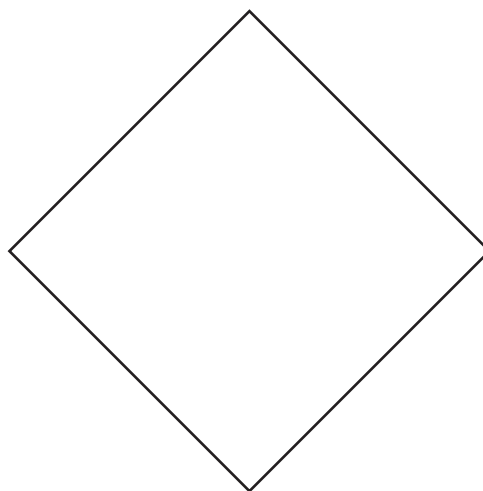
Check children's work.

1.



3

sides



4

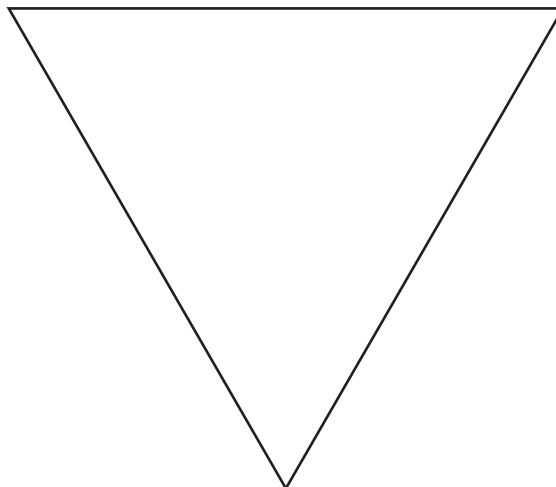
corners

2.



4

sides



3

corners

Directions

1. Color the triangle blue. How many sides does a triangle have? How many corners does a square have?
2. Color the rectangle yellow. How many sides does a rectangle have? How many corners does a triangle have?



Answer Key

Check children's work.

Challenge

Draw a square. Then draw a rectangle. How many sides does each shape have? How many corners? Color the square green. Color the rectangle red. Tell how the shapes are the same and how they are different.

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Objective

Identify attributes of cubes and spheres.

Common Core State Standards

- **K.G.2** Correctly name shapes regardless of their orientations or overall size.
- **K.G.3** Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
- **K.G.4** Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

Geometry

Cubes and Spheres

In mathematics, three-dimensional figures are also called *solids*. If something is three-dimensional, it is considered to have many dimensions; it is lifelike. A *cube* is a three-dimensional figure made up of six matching square sides, or two-dimensional shapes. A *sphere* is a three-dimensional figure having all of its points the same distance from its center. As children learn to describe solids, they will develop spatial reasoning and a greater understanding of geometric concepts.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- Explain to children that solid shapes are very different from flat shapes. Display the 1" Color Cube and the rubber ball next to the circle and square Attribute Blocks. Ask children how cubes and spheres are different from the flat shapes of the square and the circle.
- Display a ball and an orange (or other sphere). **Ask:** *How many sides do the shapes have? How many corners? How are these objects alike? How are they different?*
- Display a Color Cube, a Snap Cube®, and a cube building block (or other cube). **Ask:** *How many sides do the shapes have? How many corners? How are these shapes alike? How are they different?*

Solve It

With children, reread the problem. Place enough Color Cubes and spheres in the middle of the room so that children can come up in pairs and pick out a shape like the one Rory chose. Each child should choose a shape and then explain to a partner how they know that this is the shape Rory chose.

More Ideas

For other ways to teach about cubes and spheres—

- Provide pairs of children with 1" Color Cubes, spheres (such as rubber balls), and square and circle Attribute Blocks. Have one child choose a shape and give clues about it, including a description of its attributes, while his or her partner uses the clues to figure out the mystery shape.
- Give each pair of children a Color Cube and a ball. Have children try to find objects in the classroom that resemble these shapes.

Formative Assessment

Have children try the following problem.

Color the picture that looks like a sphere blue.
Color the picture that looks like a cube red.



Try It!

30 minutes | Groups of 4

Here is a problem about cubes and spheres.

Rory brought a building block and a rubber ball to school to play with during recess. When it was time to go outside, Rory reached into her backpack and grabbed one of the toys. It had no sides. Which toy did Rory grab?

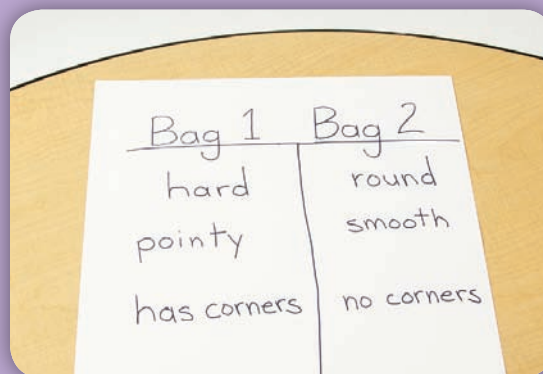
Introduce the problem. Then have children do the activity to solve the problem. Before starting the activity, for each group, place a 1" Color Cube in one bag and a rubber ball in another bag.

Materials

- 1" Color Cubes (1 per group)
- rubber balls, such as a tennis ball (1 per group)
- paper bags (2 per group)



1. Distribute bags with cubes in them. Have children reach into the bag and feel the shape without looking. List children's descriptions of the shape on paper. Ask children what shape they think it is and why. Encourage them to say how they know and use words that describe what a cube is like.



2. Distribute bags with balls in them. Have children reach into the bag and feel the shape without looking. Then list their descriptions of the shape. Introduce the word *sphere*.



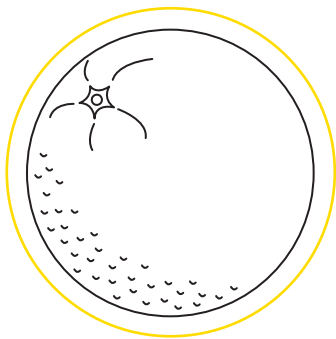
3. Have children look in the bags. Allow them to remove the ball and the cube and examine them. Tell children that the object in the first bag is a cube and the object in the second bag is a sphere.

Look Out!

Many children may have difficulty pronouncing the word *sphere*. Practice saying the word together as a class until it becomes easier. Also, watch for children who have difficulty identifying a cube or a sphere. Give the child that geometric solid to hold and touch as he or she describes the shape to you.

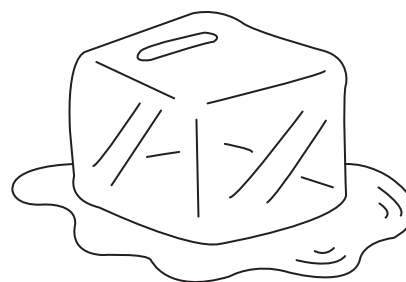


1.



0

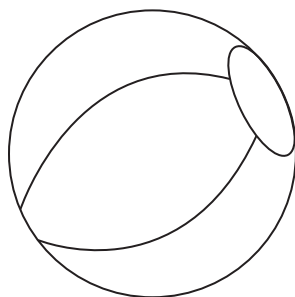
sides



0

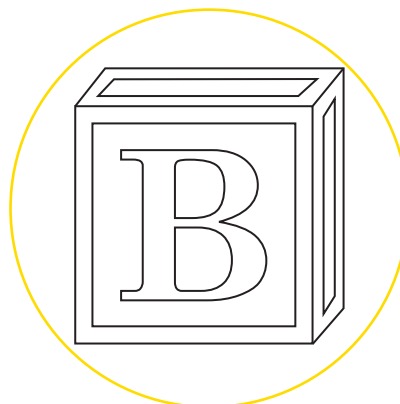
corners

2.



6

sides



8

corners

Directions

1. Which object is shaped like a sphere? Circle the object. How many sides does a sphere have? How many corners? 2. Which object is shaped like a cube? Circle the object. How many sides does a cube have? How many corners?



Answer Key

Check children's work.

Challenge

Look around the room. Find something that has a solid shape like a cube or a sphere. Draw the object. Color it red if it is shaped like a cube. Color it blue if it is shaped like a sphere.

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Objective

Explore shape attributes and spatial sense.

Common Core State Standards

- **K.G.4** Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

Geometry

Exploring Shape Attributes

Geometry in the early grades begins with describing the attributes of shapes. Attributes, such as the number of sides and corners a shape has, help children tell different shapes apart. As children become familiar with shapes and their attributes, they construct a framework for understanding not only their spatial world but also other topics in mathematics and in art, science, and social studies.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Say:** Point to a corner of the square. Now point to a side. **Ask:** How many sides does a square have? How many corners?
- **Ask:** When you put a bear in each corner of the triangle, how many bears did you use? How many sides does a triangle have? How many corners?
- **Ask:** Why couldn't you put a bear in the corner of a circle? Why couldn't you put a bear on the side of a circle?

Solve It

With children, reread the problem. Have children find the Attribute Blocks that Miguel picked out. Then have them trace the blocks on a piece of paper.

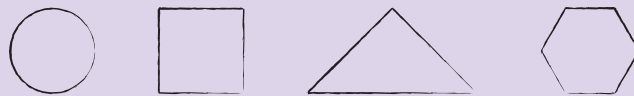
More Ideas

- Have children identify sides and corners in Pattern Blocks. Have them position several blocks on a piece of paper. Then, have them write the number of sides and the number of corners next to each shape.
- Have children draw shapes using Attribute Blocks as models. For example, tell children to choose a shape with three sides and three corners and then draw a picture of it. Then repeat with other shapes.

Formative Assessment

Have children try the following problem.

Circle the shape that has four sides. Draw an X on the shape with three corners.



Try It!

30 minutes | Pairs

Here is a problem about shape attributes and spatial sense.

Miguel and Felicia are making shape collages in class using paper cutouts of Attribute Blocks. Felicia wants to use only shapes with four corners and four sides. Miguel finds two shapes for Felicia to use. Which shapes are they?

Introduce the problem. Then have children do the activity to solve the problem.

To begin, give each pair of children blocks and five Three Bear Family Counters.

Materials

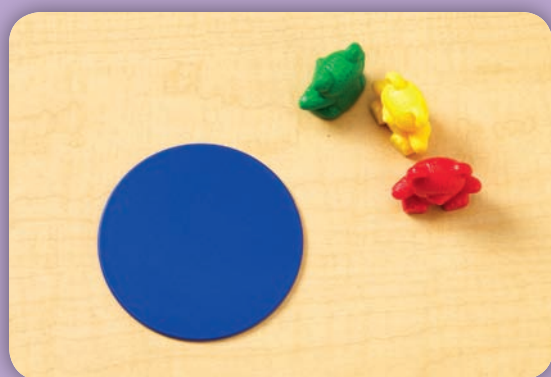
- Attribute Blocks (1 of each shape per pair)
- Three Bear Family® Counters (5 assorted bears per pair)



1. Hold up the large square block. Point out that it has four sides and four corners. **Say:** *Put a bear on one of the sides.* Make sure children are able to place bears correctly. **Say:** *Now put a bear in one of the corners.* Watch to see that children put the counters in a corner.



2. Hold up the large triangle block. Point out that it has three corners and three sides. **Say:** *With your partner, put a bear in each corner of the triangle.* Make sure children correctly identify the corners of the triangles by placing the counters in them.



3. Now hold up a circle. **Ask:** *Can you put a bear in a corner of this shape? Can you put a bear on a side of the shape?* Tell children that they cannot do either of these things because the circle has no sides and no corners.

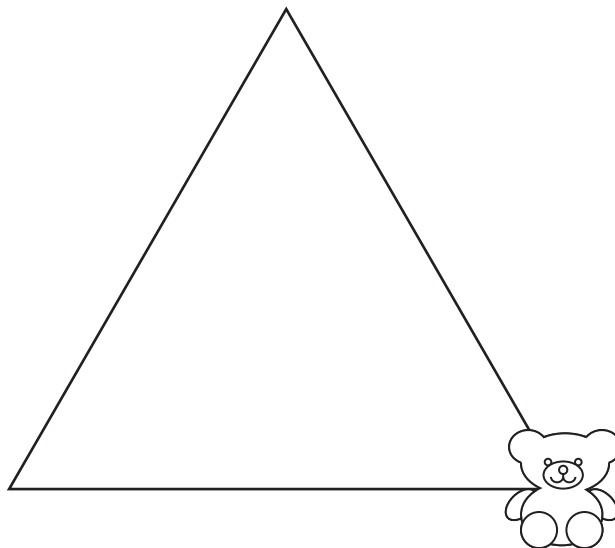
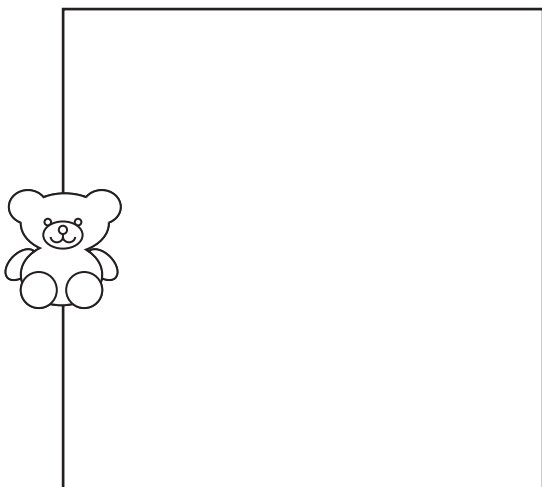
! Look Out!

Some children may think that placing a bear somewhere on the perimeter of the circle is the same as placing a bear on the side. Make sure that children understand that a side is straight, and that circles do not have sides.



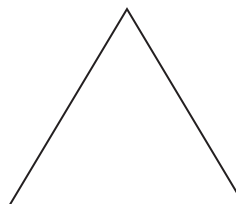
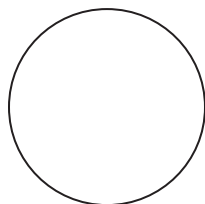
1.

Check children's work.



3 sides 3 corners

2.



Directions

1. Color the shape that has a bear at a corner. How many sides does this shape have? How many corners? 2. Find the shape with no sides and no corners. Color it green. Find the shape with 4 corners. Color it orange.



Answer Key

Check children's work.

Challenge

Use Attribute Blocks. Find a shape with 3 sides and 3 corners. Draw it and color it yellow. Find a shape with 4 sides and 4 corners. Draw it and color it red.



Objective

Use shape attributes and spatial sense to solve shape riddles.

Common Core State Standards

- **K.G.4** Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

Geometry

Shape Attributes Riddles

Analyzing characteristics of geometric shapes through hands-on exploration builds a foundation of spatial understanding. By solving riddles involving shape attributes, children will learn to associate abstract concepts of spatial sense with concrete materials like the manipulatives in this lesson.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- **Ask:** *How can we tell what is the same and what is different about Attribute Blocks shapes?* Invite children to list the attributes, such as number of corners and sides, size, thickness, and color.
- Discuss with children how they were able to figure out the riddles for other shapes. Be sure that children are discussing the shapes using the words *side* and *corner*, as well as listing the sizes and colors of the blocks.
- **Ask:** *What is the first shape in the line of shapes I described? How do you know? What is the second shape? The third?* Be sure children are putting the shapes in order from left to right.

Solve It

With children, reread the problem. Then have children find the block that Mrs. Chou was thinking of in the problem. Have children draw the block, write the number of corners and sides (0 and 0), and color the shape to match the block.

More Ideas

For other ways to teach about shape attributes—

- Have children work in pairs. One child closes his or her eyes while the other chooses and hides an Attribute Blocks shape. The other child quizzes the partner about the shape's attributes and tries to guess which shape it is.
- Have children work in pairs. One child sorts Attribute Blocks or Pattern Blocks by a chosen attribute. The other child then guesses which attribute was used to sort the shapes.

Formative Assessment

Have children try the following problem.

Circle the shape that is small, blue, and has three sides and three corners.



Try It! 20 minutes | Groups of 6

Here is a problem about solving shape riddles.

Mrs. Chou asked her class to guess which Attribute Blocks shape she was thinking of. She said it was small, thick, and red. It had no sides and no corners. What shape was Mrs. Chou thinking of?

Introduce the problem. Then have children do the activity to solve the problem.

Distribute blocks to children. Make sure children identify the different numbers of sides and corners and the different sizes, colors, and thicknesses. Tell children that they are going to play guessing games with the blocks.

Materials

- Attribute Blocks (1 set per group)



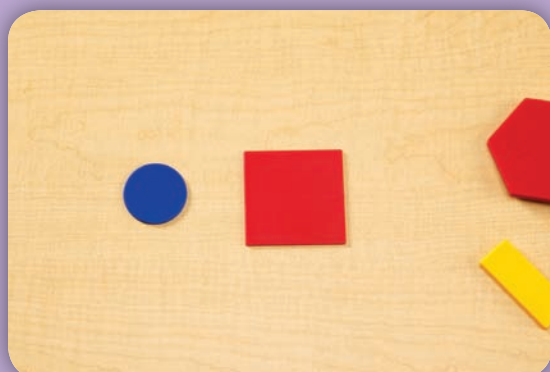
1. Say: *I am a block with three sides and three corners. Ask:* *What shape block am I?* Have children narrow down which blocks you might be talking about. They should pick out the triangles from the other blocks.



2. Say: *I am also big, thick, and yellow. Ask:* *Which block am I?* Children should hold up the large, thick yellow triangle. Repeat steps 1 and 2 for other shapes, sizes, colors, and thicknesses.

! Look Out!

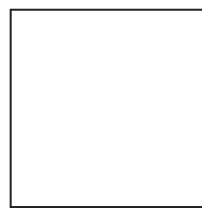
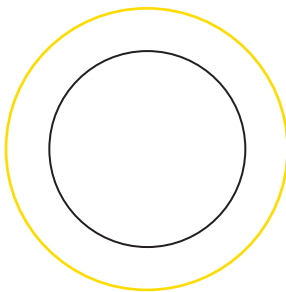
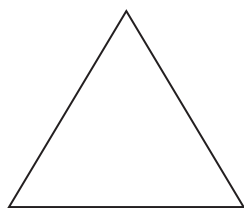
Some children may need a review of ordinal positions before they are able to do step 3 of the activity. To help children remember ordinals, start out by putting three blocks in a line. Using blocks with only one differing attribute will help focus children's attention on the positions of the blocks. Point at the blocks in order, and **say:** *The circle is first in line. The square is second, and so on.*



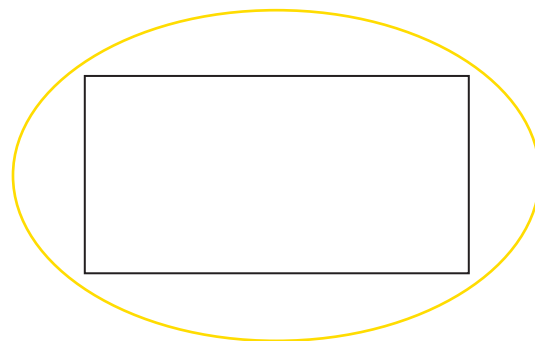
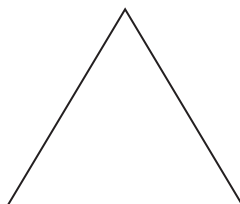
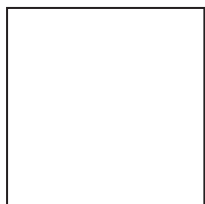
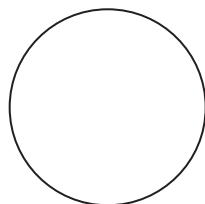
3. Say: *I am thinking of a line of two shapes. The first one is small, thin, and blue. It has no sides or corners. The second one is large, thin, and red. It has four sides and four corners. It is not a rectangle.* Children should line up the small blue circle and large red square. Repeat the activity with different orders of shapes.



1.



2.



Directions

1. Circle the shape that answers this riddle: "I have no sides and no corners." 2. Circle the shape that answers this riddle: "I have 4 sides and 4 corners. Two of my sides are longer than the other two."



Answer Key

Check children's work.

Challenge

Use Attribute Blocks. Find the shape that answers this riddle: "I have 3 sides and 3 corners. I am often used as the top of a house." Draw a picture that uses this shape. Color this shape in your picture green.

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