

Grade Level/Course: Kindergarten/First Grade
Lesson/Unit Plan Name: Attributes of 3-D Shapes
Rationale/Lesson Abstract: Kindergarten and first grade students need hands-on experiences with 3D shapes. This lesson and extension activities focus on recognizing and comparing shape attributes in order to have a better understanding of what defines each 3-D shape.
Timeframe: 30-45 minute Whole Class Lesson, Extension Activities (3) that can be done whole class, small group, or as centers.
<p>Common Core Standard(s):</p> <p>K.G.4 Analyze and compare two and three dimensional shapes, in different sizes and orientations, using informal language to describe their similarities and differences, parts (e.g. number of sides and vertices/ “corners”), and other attributes (e.g., having sides of different lengths).</p> <p>1.G.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g, color, orientation, overall size); build and draw shapes to possess defining attributes.</p>

Instructional Resources/Materials:

- 3D shapes small- one for each student (these can be small shapes such as this set: [Lakeshore 3D Shapes Small Set](#) or you can create your own set by collecting items)
- 3D shapes large - ([Lakeshore 3D Shapes Large Set](#) optional but good for demonstrating attributes on shapes)
- Chart Paper
- Hula Hoops
- Index cards for labeling sorting groups
- Box for hiding “Mystery Shape” (Extension Activity 1)
- Paper for tracing shape faces (Extension Activity 2)
- Toothpicks in two different lengths (Extension Activity 3)
- Mini Marshmallows or small balls of playdough (Extension Activity 3)

Activity/Lesson:

Part 1 – Directed Whole Class Lesson

Have students sit in a circle or around perimeter of rug.

Pass out a 3-D shape to each student making sure that students sitting next to each other do not have the same shape but they can have a shape that is the same color.

Activity/Lesson continued:

Tell students, **“ Today we are going to explore some new shapes.”**

“I want you to look at the shape I am giving you and think about what you notice about it.”

“Once everyone has had a chance to look at their shape then we will share some of our ideas.”

Give students several minutes to look at their shape. They may touch it, feel it, some may try rolling it or stacking it on the carpet in front of them.

“Let’s share out what we noticed about our shapes.”

You can have students verbally share out or you may also make a list on the white board or a piece of chart paper with their descriptions.

If you have a large set of the 3-D shapes you can show and display the attributes they describe so all students can see.

Possible student responses may be:

“It is a square.”

“It is a circle.”

“It has a point.”

“It looks like an ice cream cone.”

“It is flat.”

“It is round.”

“I can roll it.”

“It looks like a box.”

Students may describe the shape using descriptions and terms they are familiar with from learning about 2-D shapes. You can justify their response and rephrase it to reflect correct attributes for 3-D shapes.

“You said your object is a square, we can see a square face on this side of the shape.”

“We talked about points or corners being called vertices when we learned about shapes before, so we can call these vertices too.”

As students share out their description you can ask other students to show a “thumbs up, thumbs down” if their shape has the same attribute too.

“Sam said his shape has a square or what we will call a square face, does anyone else have a shape that has a square face on it somewhere?”

Once students have shared out their descriptions have them partner up with someone sitting

Activity/Lesson continued:

next them and compare their two shapes.

“Now I want you and your partner to look at the two shapes that you have and see what is the same about your two shapes and what is different about them.”

Allow students time to discuss similarities and differences about their shapes and then have several partners share out what they discovered. Ask students to put shapes down on rug in front of them unless they are describing their shapes.

“Kim and Mike, what did you notice about your two shapes that were the same and different?”



Possible student comparisons/ responses may be:

“I noticed that my shape (cylinder) and his shape (cube) both have a flat face.”

“Mine has circles and his has squares.”

“I can roll my shape on the ground and he can’t.”

Follow up by asking students, **“Why do you think she can roll her shape? “What makes it easy to roll.” “Oh you see a curved surface, it is not all flat so it is able to roll.”**

Again, as students get more proficient with correct vocabulary for labeling attributes, rephrase their descriptions as needed using choral response to give all students practice.

“What do we call those corners again?”

Class responds, **“vertices.”**

“And we can call this triangle on this shape a triangle . . .?”

Class responds, **“triangle face.”**

You can follow up with additional questions too.

“I see several square faces on this shape.”

“Let’s count how many.” Chorally count **“1, 2, 3, 4, 5, 6”** as you touch each face.

Activity/Lesson continued:

If time permits and students are still engaged you can have them partner up with student on the other side of them to compare again.

“Now that we have learned some things that are the same and different about our partner’s shape let’s see if we can compare all of our shapes.”

“I have these two hula hoops here that we are going to use to sort our shapes into two groups.”

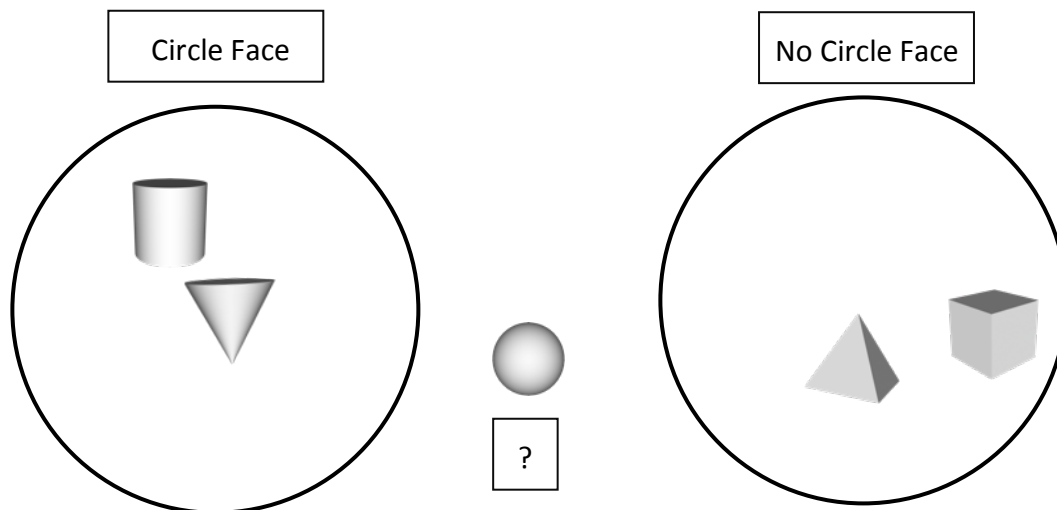
Call on one student to describe one thing they noticed about their shape.

“Karen, you said your shape has a circle face.” “Let’s make all the shapes in this hula hoop have at least one circle face.” “And this other hula hoop will have all shapes that don’t have any circle faces.” “I will make a label for this hula hoop say *Circle Face* and this hula hoop *No Circle Face*.”

“Karen, put your shape in the *Circle Face* hula hoop.” “Anyone else have a shape that they think would go with Karen’s in the *Circle Face* set?” Allow students to place their shape in the hula hoop even if they are incorrect.

“OK, so now we have our other hula hoop which is for *No Circle Face*.” Anyone have a shape that they think would belong here?” Again allow students to place their shape in hula hoop even if it is incorrect.

“Let’s look at our two sets.” “Give me a thumbs up if you think we sorted our shapes correctly.” “Give me thumbs down if you think there are some shapes in the wrong set.”



Allow students who think there is a shape in the incorrect set to point out the shape and justify why they think it belongs in the other set. Students often place the sphere in the *Circle Face*

Activity/Lesson continued:

set. Discuss with class how a face has to be flat surface and that a sphere has a curved surface all the way around. You can demonstrate that a flat face will allow a shape to stack on another flat face.

“We can’t stack the sphere without it rolling away.”

Once all shapes have been moved to the correct set you can ask additional questions about each set.

“Point to the set that has more?”

“Do we need to count or can we look and estimate?”

“Which set has less?”

“How many shapes does it have?”

Repeat activity again by having students take a shape out of the hula hoop. Instruct students to take a shape that is different than the shape they had before.

Other ideas of ways to sort:

Vertices/No vertices

Curved surface/No curved surface

Rolls/Does not roll

Square face/No square face

Triangle face/No triangle face

Avoid using number of faces, edges, or vertices. It is hard for young students to keep track while counting these on a 3-D shape (e.g., 6 edges, 6 faces, 8 vertices).

Extension Activity 1

Play a game of “What Am I . . .” by describing attributes of shapes. Students all have a shape and start by standing up. One by one give attributes of a certain shape that is hidden in a “Mystery Box or somewhere where students can’t see it. If student has a shape with that attribute they remain standing. If their shape does not have that attribute they sit down.

For example:

I am a 3D shape.

I have a circle face.

I have one vertex.

What am I? (Cone)

Activity/Lesson continued:

I am a 3D Shape.
I have vertices.
I have one square face.
I have a triangle face.
What am I? (Pyramid)

Variations:

Partners can play this game if they each have a set of shapes and play back to back. One partner takes a shape in his/her hand and describes it while the other partner looks at their own shapes and tries to guess which shape is being described.

Play “5 Questions” where students ask you 5 questions about your hidden shape by asking yes/no questions about its attributes. Record your answers and after 5 questions see if students can guess what your shape might be.

Square face? – no
Stacks? - yes
Circle face? – yes
Curved surface? – yes
Vertices? – no

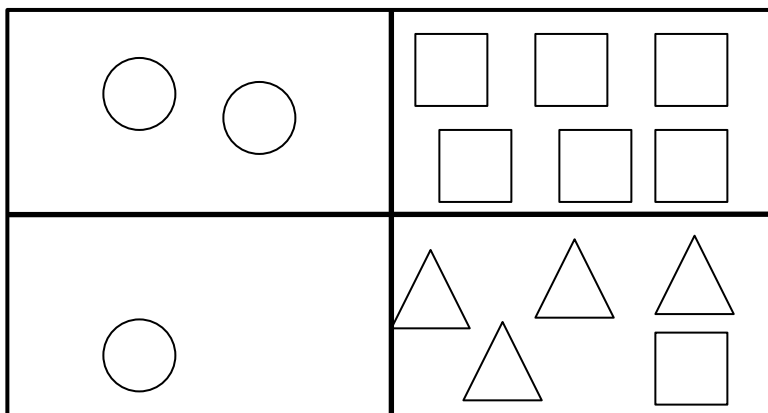
What is it? (Cylinder)

Extension Activity 2

Give students a piece of paper folded into fourths and then unfolded to show crease marks. Have students trace the faces of a 3D shape in one of the rectangles on their paper. They can repeat with 3 other shapes, one in each box.

Discuss with students, **“Which shapes were easy to trace, which shapes were hard?”**
“Why is it hard to trace the sphere?”

See if they can guess which shape a partner traced from the faces on the paper.



Activity/Lesson continued:

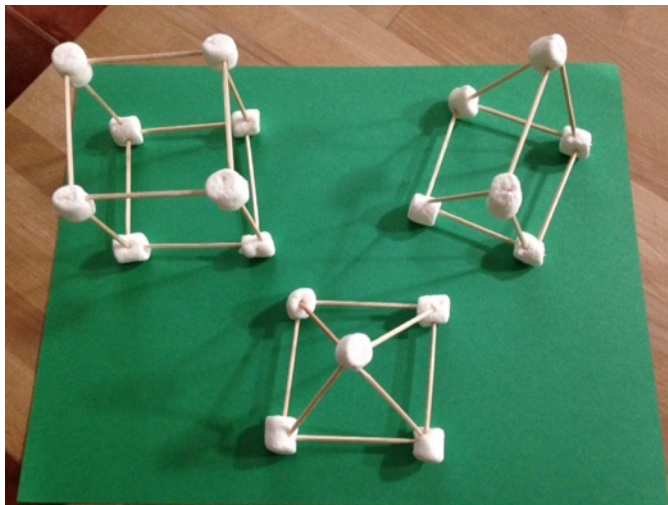
Extension Activity 3 (best for first grade students)

Students can build 3-D shapes using toothpicks (two different lengths) and marshmallows (or playdough).

To build a cube: Instruct students to find 4 toothpicks all the same length and arrange them in a square on their desk. They can then use marshmallows or small balls of playdough to connect to form a square face. Once they have connected them they can use four more toothpicks the same length to build up vertically attaching another marshmallow at the top of each toothpick. They can then build another square face on top with 4 additional toothpicks to complete the cube.

Students can count the number of toothpicks they used (12) for the number of edges a cube has and the number of marshmallows/balls they used (8) for the number of vertices. They can also find all the square faces (6).

You can guide students through building other shapes (pyramid, rectangular prism, triangular prism, etc.) or let them free explore to see what shapes they can build and discuss the attributes (faces, edges, vertices) of their shapes.



Assessment:

As an exit ticket give each student a shape and have them sort in the correct labeled hula hoop (for example, vertices/no vertices, triangle face, no triangle face) on their way to recess, lunch or before they go home. Record responses by writing down observational notes if they sorted correctly by attribute or not. Can be repeated throughout 3D Shapes Unit.