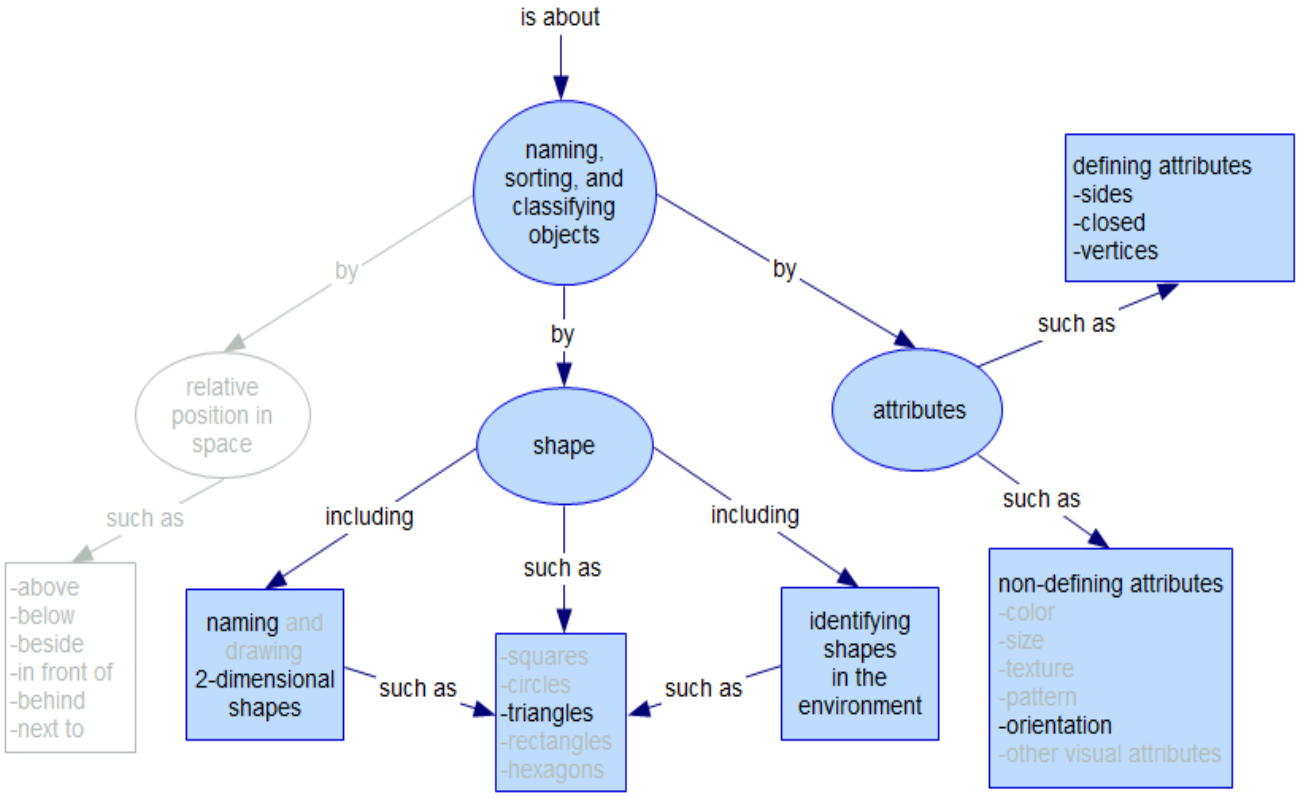
Kindergarten: Mathematics
Highlight Lesson Plan
Unit 1: Exploring Attributes and Shapes – Part 1

Overarching Question
What role do shapes have in our world?

Previous Unit:	**This Unit:** Exploring Attributes and Shapes – Part 1	**Next Unit:** Exploring Number



Question to Focus Assessment and Instruction:

1. What makes a square (circle, triangle, rectangle, hexagon) a square (circle, triangle……)
2. What shapes do we see in our environment?
3. How do we describe the position of objects relative to other objects?
4. What are some ways we can sort a group of objects?

Intellectual Processes
Standards for Mathematical Practice

Students will have opportunities to:

- ***construct viable arguments and critique the reasoning of others*** when describing the attributes of a sorting rule or of geometric shapes found in the environment***;***
- ***look for and make use of structure*** when sorting and classifying objects and identifying geometric shapes in the environment; and
- ***look for and express regularity in repeated reasoning*** when recognizing that the name of the shape remains the same, regardless of its size and orientation.

Key Concepts:

sort	squares	rectangles	relative positions	beside	next to
classify	circles	hexagons	above	in front of	
attributes	triangles	2-dimensional	below	behind	

Lesson Abstract:
Because this is a lesson in the Unit 1, it will be taught early in the year, when many children are just learning "to do" school. Learning to recognize and name basic 2-dimensional shapes is usually one of the first topics teachers address. This lesson can be a template for future lessons, working with different shapes. The topic is "triangles." Children enter kindergarten with many experiences and ideas about shapes, some on which to build, some that contribute to misconceptions. This lesson makes no assumptions about what students already know. Students will hold a triangle in their hand, and describe what they notice about a triangle. The purpose of the lesson is to provide students with a common experience that connects a visual image and a kinesthetic model to descriptive language. Taking into consideration a short attention span, this is a 2-day lesson. Although the focus of the lesson is on the distinguishing characteristics of triangles, and the example used is an equilateral triangle, many examples students will see in books and in the environment will have sides of different lengths. It will be important to point out explicitly that the length of the sides of a triangle does not have to be the same.

Common Core Standards

Kindergarten, Measurement and Data

K.MD.B. Classify objects and count the number of objects in each category.

- K.MD.B.3. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

Limit category counts to be less than or equal to 10.

Kindergarten, Geometry

K.G.A Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

- K.G.A.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.A.2 Correctly name shapes regardless of their orientations or overall size.

K.G.B Analyze, compare, create, and compose shapes.

- K.G.B.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).
- K.G.B.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
- K.G.B.6 Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"

Instructional Resources
Day 1
- a read-aloud book about triangles, e.g., one of those listed in the unit resources* or another one you can access
- 1 pattern block triangle for each student
- 1 green paper demonstration equilateral triangle (blackline master in lesson resources)
- 1 paper demonstration triangle that is NOT equilateral and NOT green (blackline master in lesson resources)
- 1 orange paper demonstration square (blackline master in lesson resources)
- chart paper
- baskets of different shaped objects, e.g., pattern blocks, buttons, at least one for each table. Make sure there are 6-8 green pattern blocks at each table
- poster: Shape Sorting (blackline master in lesson resources)
- poster: Triangle Orientation (blackline master in lesson resources)

Day 2
- different shaped/size paper triangles for students to use for their "triangle story"
- "story paper" for making a class book, (blackline master in lesson resources)

* Read-aloud suggestions:
Triangle, by Robin Nelson. (2009). Lerner Classroom Publisher
Triangles, by Jennifer S. Burke. (2000). Scholastic Library Publishers

Sequence of Lesson Activities

Lesson Title: What is a Triangle?

Advanced Preparation:	
1. Collect enough pattern blocks so that each student will have one to hold. 2. Cut out a demonstration triangles and square. Attach the green triangle to the poster paper in such a way that you can move it around on Day 2, e.g., with masking tape on the back. You will want to move it to show different orientations. **3.** Duplicate the story paper for Day 2. 4. Prepare triangles for students to use for their story	
Selecting and Setting Up a Mathematical Task	
By the end of this lesson what do you want your students to understand, know, and be able to do?	By the end of this 2-day lesson, students will be able to • identify that a triangle has 3 sides • state that a triangle has 3 corners or points or angles • state that the sides of a triangle are straight • state that the sides of a triangle connect • recognize an equilateral triangle in different orientations • write/draw a page for the class book with a shape in the environment that looks like a triangle **NOTE:** Students often know enough about geometric shapes to recognize objects that have features that make them look like triangles. Examples are an ice cream cone, a witch's hat or a party hat. Although it's not necessary to point out at this point that these are, in fact, cones, not triangles, it is important that, as teachers, we are careful about *our* language and that we model correct terms. Otherwise, we are perpetuating misconceptions that will later need to address. Suggestion: When students call a 3-dimentional object "a triangle", respond with, "Yes, that (picture of a) hat does *look like a triangle*." This will be particularly relevant to the Day 2 lesson.
In what ways does the task build on students' previous knowledge?	As in all areas, children enter kindergarten with an enormous range of experiences and conceptions. Some may have had direct instruction about shapes – either at home or at a pre-school. All will have picked up incidental information from TV or other sources. Most will begin the year with both "correct" understandings and misconceptions that are not readily apparent.
What questions would you ask to help students access their prior knowledge?	Show students the demonstration triangle. *What is this shape?* *Where have you seen this shape before?*
Launch:	
How will you introduce students to the activity so as to provide access to all students while maintaining the cognitive demands of the task?	Launch the lesson by reading the "triangle book" you chose for a read-aloud. After you have read and discussed the triangles in the book, move to the lesson activity below. *When I tell you to stand, I want you to quietly and slowly go to your table and look in the basket at your table for one triangle. When you find it, bring it back up here and look at it very carefully.* After a minute, say*, talk with your elbow-buddy about what you noticed about your triangle.*
What will be heard that indicates that the students understood what the task is asking them to do?	*I want you to tell me everything you can about your triangle. What do you notice about it?* Students will talk about many attributes. They may say • It's green. • It has three sides. • It has three corners or angles or points. (Although you may refer to "angles", students may prefer corners.) • The sides are straight. • It's little. • It comes to a point at the top. Write students' observations next to the demonstration triangle.

Explore:

What questions will be asked to focus students' thinking?

Now let's look at all the observations you've made.
Pose questions that reflect the observations students made above. As you go through the list, cross out those statements that are not defining for all triangles. Confirm with students, e.g., *So you're saying that a figure does not have to be green in order to be a triangle?* or *So you say that a shape must have 3 sides in order to be a triangle?*

- *Does a triangle have to be green to be a triangle?* (Show the brown triangle.) When students say, "no", erase or cross out that attribute on the chart.
- *Does a triangle have to have three sides?* If students hesitate, show them the orange demonstration square. *How many sides does this shape have?* Point to them as students count them. *Is this a triangle? Why not? If a shape has 4 sides, is it a triangle? So, does a triangle have to have three sides to be a triangle?*
- *Does a triangle have to have 3 corners to be a triangle?* If students aren't sure, show the square again and have students count the corners.
- *Does a triangle have to be little to be a triangle?* Point to the large demonstration triangle you have posted.

How will you extend the task to provide additional challenge?

- *Do the sides of a triangle have to be straight?* Draw a triangle with one or more concave and/or convex sides.
- *Does a triangle have to have a point at the top in order to be a triangle?* (This may be the most tricky question. Often students don't believe that a shape that is oriented in a different way is the same shape.) Physically and very explicitly and slowly rotate the green triangle so that students see the way you change the way it is oriented. Reinforce this idea by saying, *No matter how I turn this shape, it still has 3 sides and 3 corners, so it is still a triangle.*
- *Do all the sides of a triangle have to be the same length?* Looking at a scalene or isosceles triangle: *Is this a triangle? How do you know? How is this triangle different from this one (equilateral triangle)? How are they alike?*

Summary:

What specific questions will be asked so that students make connections between the different strategies that are presented?

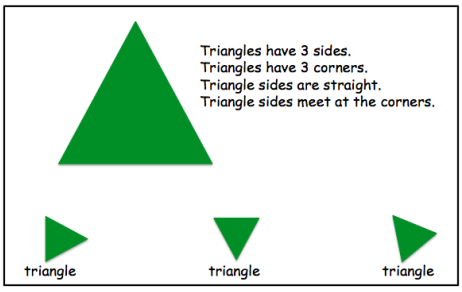
What will be seen or heard that indicates all students understand the mathematical ideas you intended them to learn?

Let's look at our triangle again. What do we know about this triangle that is true for all triangles?

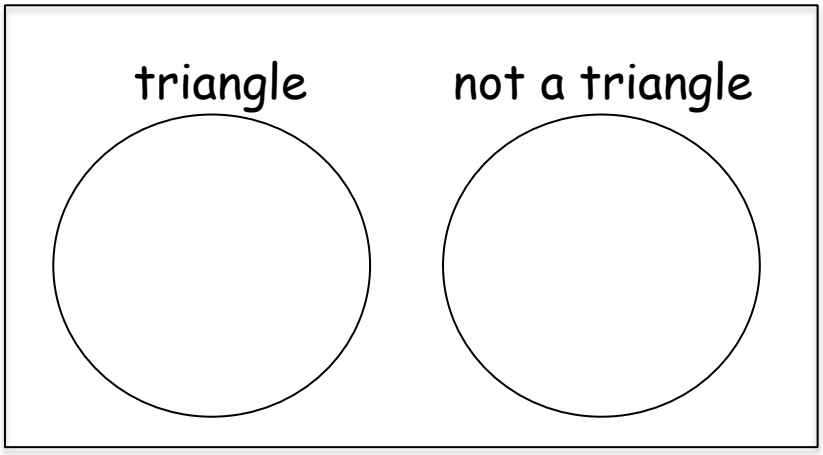
Students should say,

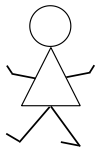
- A triangle has 3 sides.
- A triangle has 3 corners/angles/points.
- A triangle's sides are straight.
- The sides of a triangle connect or meet at the corners.
- No matter how you turn a triangle, it is still a triangle.

To reinforce these properties, create a poster like the one below, displaying an equilateral triangle in different orientations.



Check for understanding:
Place a variety of 2 dimensional shapes on a piece of butcher paper, white board, promethium board, or under a document camera – for example, three

	or more triangles (different sizes, colors, orientation), one or more hexagon, square, rhombus and/or rectangle. Then ask students to identify which ones are triangles and to explain why they are triangles. As an informal assessment, see which of these other shapes students can identify by name. You may have them explain why the other shapes are not triangles. This gives students an opportunity to apply the criteria they established for a triangle and to differentiate a triangle from other shapes they see. Center activity: Provide a shape sorting mat for sorting and a collection of object with different shapes. Have students sort the shapes: *Triangle* and *Not a Triangle.* 
Day 2	
Selecting and Setting Up a Mathematical Task	
Objective	By the end of this lesson, students will have… • created a page for the class book with an object they see in the environment that *looks like a triangle.*
In what ways does the task build on students' previous knowledge?	Students will think about the book read the day before about triangles and reflect on the lesson identifying the defining attributes of a triangle. You may wish to do an interactive read-aloud with a different book today.
What questions would you ask to help students access their prior knowledge?	Post a chart on which you have drawn a variety of shapes, e.g., hexagons, squares, trapezoids, different kinds of triangles, circles and other non-polygons. *Yesterday we talked a lot about triangles. We're going to begin our math lesson today by checking to see what we remember about triangles. Look at this poster. When I call on you, I want you to come up and point to one triangle and tell us how you know this is a triangle.* Make note of those students who might still be struggling to identify the distinguishing attributes of a triangle. You may also have students explain how they know that the other shapes are NOT triangles.
Launch	
How will you introduce students to the activity so as to provide access to all students while maintaining the cognitive demands of the task?	*When we read about triangles (yesterday), the author gave us lots of ideas about triangles. What were some of the ideas about triangles that the author wrote about?* *What did we learn about triangles that we recorded on our chart?* *Today we're going to come up with our own ideas. Can you think of something you've seen that looks like a triangle?* Give children an opportunity to share their ideas, probing for more detail (*Tell us more about how that looks like a triangle*) if their comment is not clear. If

	they have named an example that is NOT a triangle, probe for more detail, using the attributes you have listed on a chart. *We're going to write our own book about triangles. We'll call it "Triangles." Everyone will write one page to put into our book.* Show them the story page you have for them. Tell them that they are going to draw a picture of something that looks like a triangle. Then they will write below their picture what the item is. NOTE: You may tell them that you will help them write the word(s) if they need help with the writing or you may just let them use "kindergarten spelling." Tell them that you have some triangles that they can use in their picture OR they can draw their own triangle(s). Model the process for students, thinking of your own idea or using an idea from the book. Show how you will use a triangle or triangles in your picture, pasting on the triangle(s) or drawing them on the page, then drawing and coloring the rest of the picture. Students may want to draw something they see in the room, e.g., an object shaped like a triangle, an object from the shape book(s) you have read, or use a triangle in an imaginary way, e.g.,  Remind students to think about the ideas they just shared and to think about other things that look like triangles. Give them a little silent "think time," then have them share with their shoulder buddy what they are going to create.
What will be heard that indicates that the students understood what the task is asking them to do?	Before sending them back to their seats, have students restate what they will be putting on their paper: 1. Name (a book author) 2. Picture 3. A word (or words) for the picture *When we draw a triangle, what do we know about a triangle that we have to remember?* - 3 sides - sides are straight - 3 corners (corners with points) - sides meet at the corners Straight sides and corners with points will be difficult for students to draw with precision.
Explore	
What questions will be asked to focus students' thinking?	*As students go to a seat to get started, ask such focusing questions as* • *What object are you thinking about that looks like a triangle?* • *Where will you paste/draw the triangle on your page?* • *Will you draw one triangle or do you need more in your picture?* • *What other things will you put in your picture?* • *What word(s) will you write below your picture?* • *Do you want to write your word(s) by yourself or would you like some help?*
How will you extend the task to provide additional challenge?	Students who finish quickly might 1. Put more detail in their picture. 2. Create an additional page for the book. 3. Write more about their object on the back of the page. 4. Make a variety of triangles on a geoboard. Depending on the skill of the students, they could record their findings on geoboard paper, connecting the dots to form triangles.

Summarize	
What specific questions will be asked so that students make connections between the different strategies that are presented? What will be seen or heard that indicates all students understand the mathematical ideas you intended them to learn?	In an "author's circle", have students share their pages, explaining how their object looks like a triangle. Ask students to show their triangles' 3 sides and 3 corners and how the sides meet at the corners. *How are the triangles on your pages alike?* • They all have 3 sides. • They all have 3 corners or points or angles. • The sides are straight (almost). • The sides meet at the corners. *How are they different?* • They are different sizes. • They are different colors. • They are in different directions (orientations). • Their sides are different lengths. *We can see that all of your triangles are alike in many ways and different many ways, but they are all triangles.*