Grade Level/Course: Kindergarten – First Grade

Lesson/Unit Plan Name: Geometry and Justifying in Primary Mathematics

Rationale/Lesson Abstract: Students in kindergarten and 1st grade often successfully master the skills of identifying basic geometric figures but struggle to justify the attributes that define them. This lesson will provide students opportunities to explore geometric figures and define them by attributes.

Timeframe: Five 30 minute mini-lessons that can become workstations or centers.

Common Core Standard(s):

Kindergarten 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).

Grade 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.

California State Standard(s):

Kindergarten MG 2.1 - Identify and describe common geometric objects (e.g., circle, triangle, square, rectangle, cube, sphere, cone).

Grade 1 MG 2.1 - Identify, describe, and compare triangles, rectangles, squares, and circles, including the faces of three-dimensional objects.

Instructional Resources/Materials: Sand, flour, shaving cream, or sugar**;** paper plate**;** finger paints and paper; toothpicks and glue; geometry cards; justifying sheet

Activity/Lesson:

Objective- Students will identify and describe common geometric objects while justifying their classification.

Vocabulary - Make sure you are using academic vocabulary while you are teaching the lesson. Some words that you will want to reinforce are: circle, triangle, square, rectangle, rhombus, parallelogram, trapezoid, hexagon, angle, vertices, side, polygon, shape, parallel, opposite, equal, and closed. Students do not need to memorize these terms but should be exposed to them.

Activity 1a- Students need opportunities to explore shapes by building them. One way to do this is to pour sand, flour, shaving cream, or sugar onto a plate and have the students draw the shapes with their fingers. The teacher shows the students a picture of a shape and then demonstrates how to draw the shape. The students practice on their plates. They can "erase" their drawing by gently

shaking the plate. Make sure routines and procedures are reviewed to prevent a mess. The teacher should think-aloud the attributes of the figures as she draws them, i.e., this shape has four equal sides and four equal vertices, the opposite sides are parallel, and it is a polygon because it is a closed figure.

Activity 1b- Students can also build shapes using finger paints. Again, the teacher models how to draw the shapes while the student follows along using finger paint on paper. The teacher discusses the figures attributes while the students paint. Students should be asked to tell the class why their shape is a rectangle or triangle.

Activity 1c- Students build shapes using toothpicks and glue. The teacher focuses on making sure the shapes are all closed (polygons), that the opposite sides are parallel (if applicable), and that angles are right (with all rectangles).

Activity 2 - Teacher prepares geometry cards by printing and cutting them out. She passes out the cards with the shapes on them. She keeps the cards with the attributes listed. She reads off the attributes and the student(s) with the shape holds it up and says the name of the shape.

This activity can also be done with the students holding the attribute cards and the teacher holding up the shape cards. The teacher asks, “What is this figure?” The student with the attributes card says the name of the figure and says/reads the attributes.

This activity can be made into a matching game played by one or more students during centers or workshop time.

Activity 3 - The teacher prepares geometry cards by printing and cutting them out. The teacher passes out the cards with the single attributes listed on them. She keeps the cards with the shapes on them. She holds up the shape card and asks, “What are the attributes that define this shape?” The students with the attribute cards that correspond with the shape hold up their card and say why their card is an attribute for that shape.

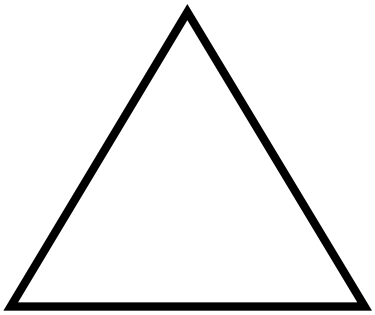
The teacher passes out the shape cards to the students. She pulls an attribute card out of the pile and asks, “Which shapes have four sides?” All the students with figures that have that attribute stand up. The teacher can arrange the attribute cards so that many students stand up when the first attribute is read and then more and more students sit as the definition becomes more precise.

The teacher should point out that some figures have many of the same attributes. She can also point out that some shapes can be called by many different names, i.e., a square is also a rectangle, a parallelogram, and a rhombus. Also, all closed shapes with more than 2 sides are polygons.

Activity 4 - The teacher prepares geometry cards by printing the shape on one side and the attributes list on the others side. The teacher passes out sets of cards to pairs of students. One student practices by looking at the shape and listing the attributes, or looking at the attributes and naming the shape. The other student verifies the answer(s). Both students are engaged and learning by thinking about the information on their side of the card. Single students can also practice by reading the attributes and then drawing the shape. They then check their work by flipping over the card.

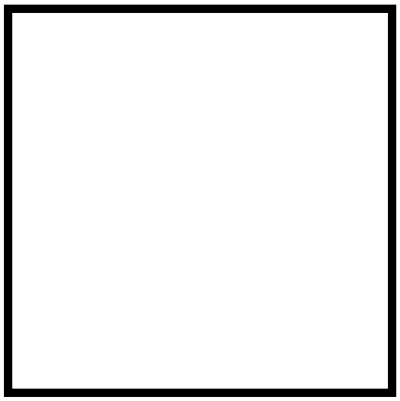
Activity 5 - The teacher passes out the Justify Geometry worksheet. The students are given a shape to draw on one side of the paper and write the attributes on the other side of the paper. The teacher may scaffold this activity by creating a word wall on chart paper or a whiteboard. Cloze sentences can also be presented for students to use.

Assessment: The student work serves as the assessment piece for these activities. Students can record their work on the Justify Geometry sheet or write their justifications on their drawings.

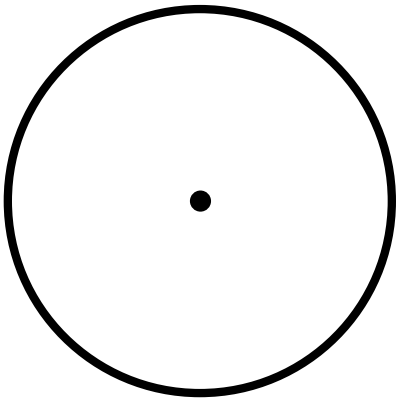


- **3** sides
- **3** vertices
- **Polygon**

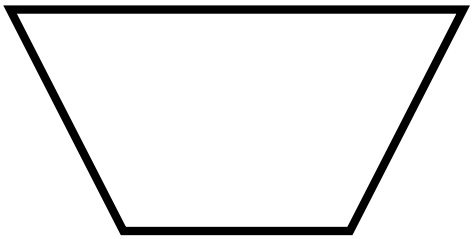
- **4** sides
- **4** equal = angles
- **Opposite** sides are equal =
- **Opposite** sides are parallel ||
- **Polygon**



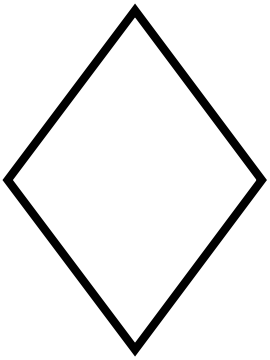
- **4** equal = sides
- **4** equal = angles
- **Opposite** sides are parallel ||
- **Polygon**



- **All points** the **same distance** from the **center**
- **Not** a **polygon**

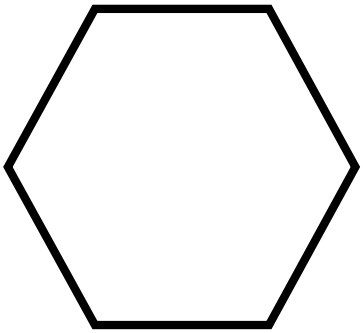


- **4** sides ——
- **1** pair of **opposite sides** are equal =
- **Polygon**



- **4** equal = sides ——
- **Opposite** angles ∠ are equal =
- **Opposite** sides are parallel ||

- **4** sides ——
- **Opposite** angles ⌊ are equal =
- **Opposite** sides are equal =
- **Opposite** sides are parallel ||
- **Polygon**



- **6** sides ——
- **Polygon**

4 sides

—

Polygon

Opposite angles ∠

are equal =

4 equal =

sides —

Opposite sides —

are equal =

Opposite sides —

are parallel ||

1 pair of **opposite**

sides are equal =

6 sides —

All points the **same distance** from the **center**

Not a **Polygon**

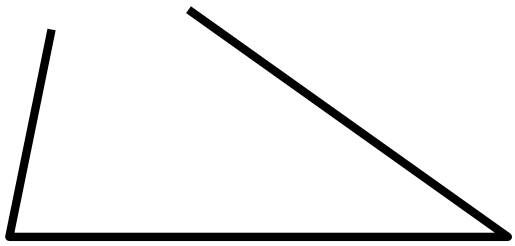
Open figure

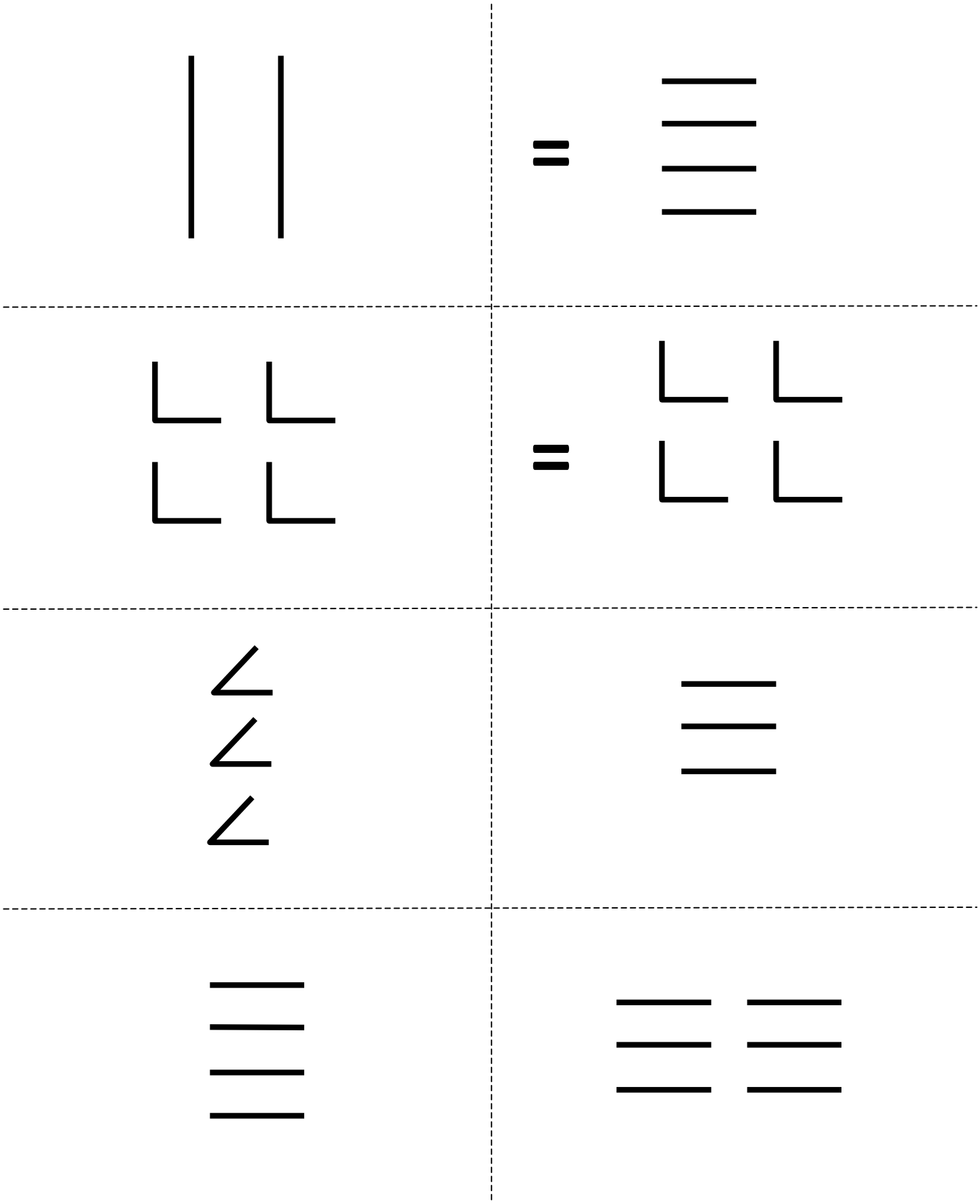
4 equal

=

3 vertices

3 sides





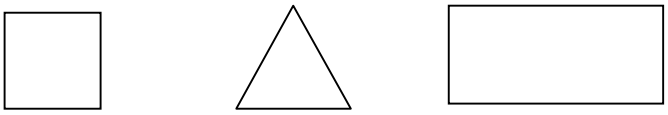
Justify Geometry

Shape	Attributes

Name _____

Kindergarten MG 2.1
CC K.G.4

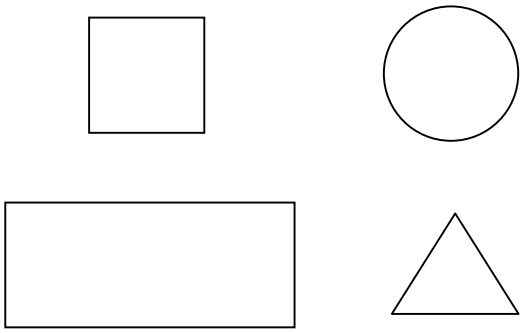
Which of these is a square?



Explain why you think it is a square? What are the other figures? Why?

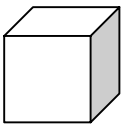
Grade 1 MG 2.1
CC 1.G.1

Which shapes would you put in the same group? Why?



Grade 2 MG 2.1
CC 2.G.1

What is the face of a cube?



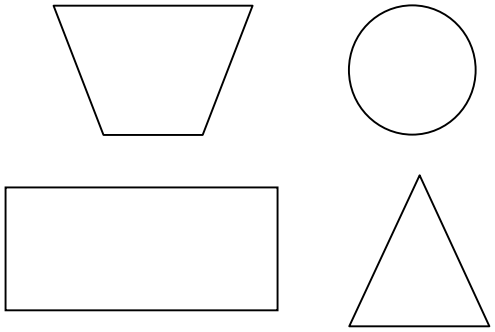
A triangle **B** circle

C square **D** trapezoid

How many faces does a cube have?

Grade 3 MG 2.1
CC 3.G.1

Which shape below is not a polygon?



Why is the shape not a polygon?