

Mathematics: The Language of STEM
Exploring Sorting & Organizing
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CONTENT AND TASK DECISIONS

Grade Level(s): *Kindergarten*

Description of the Task:

Students will understand how to sort groups of objects in different ways using their attributes.

Indiana Mathematics Content Standards:

K.DA.1: Identify, sort, and classify objects by size, number, and other attributes. Identify objects that do not belong to a particular group and explain the reasoning used.

K.NS.5: Count up to 20 objects arranged in a line, a rectangular array, or a circle. Count up to 10 objects in a scattered configuration. Count out the number of objects, given a number from 1 to 20.

Indiana Mathematics Process Standards: Identify (by number) the Indiana mathematics process standard(s) that your lesson will address, and describe how students will be engaged in the process(es).

PS.7: Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. They step back for an overview and shift perspective. They recognize and use properties of operations and equality. They organize and classify geometric shapes based on their attributes. They see expressions, equations, and geometric figures as single objects or as being composed of several objects

Mathematics Content Goals: Students will understand that objects can be compared and classified in many ways.

Language Objectives: Students will understand how to explain and justify their reasoning for sorting/classify objects into groups using manipulatives and photographs of their sorts.

Materials: counting bears, any type of counters (bugs, fruit, etc.), connecting cubes, chips, attribute blocks, beads, etc.

Sorting circles, charts, small flat boxes, sorting tray, etc.

Sort it Out! by Barbara Mariconda

THE LESSON

Before: This phase of the lesson should be designed to get students ready for problem solving. It also provides an opportunity for you to find out what they already know about the topic. Describe how you will accomplish each of the following in this phase of the lesson:

- **Activate prior knowledge:** (including the specific questions you will ask to raise students' curiosity and activate or determine their prior knowledge), Read aloud the story, *Sort it Out!* by Barbara Mariconda. Discuss what happened in this story? When we put things in groups based off of similarities what is that called? Sorting. Turn and talk to a neighbor about some ways the mouse in this story sorted the objects. Display 3 objects so the students can see. Have a discussion about them. Model: I notice... (I notice this object is red) then have students explain thinking about what they noticed about the objects. Give them a sentence start, "I noticed..." . Ask, "What do you notice?"
- **Be sure the problem is understood,** and ask, what did we just do? We described what objects look like and how they are the same or different. What else can we do with these objects? turn and talk to a neighbor. Students share out about what they discussed with partner (Ideally students will share about sorting or grouping objects together. In case that doesn't occur add more than 3 objects and have students discuss again.)
- **Establish clear expectations** (including the specific expectations you have for students to record their mathematical thinking in writing or drawing). Now I want you to do the same thing with a new group of objects. Sort or group these objects together in one way. Once you have found one way, continue to find more ways. Record each sort by taking a photograph with your iPad and then raise your hand and I will also record your findings.

During: This phase of the lesson should be designed for students to explore the focus task. Describe specifically what the students will be doing in this phase. Include a description of how the students will record their mathematical thinking in writing or drawing throughout the investigation. Describe how you will accomplish each of the following in this phase of the lesson:

- **Let go,** Students break into groups of 4-5 students around the room. Pass out one kind of objects with different attributes to each group (Example of one group- counting bears that are different colors & sizes another group receives dinosaurs that are different kinds and colors)
- **Listen actively,** Teacher walks around, listens, and asks questions to groups.
- **Provide appropriate support** including the specific questions you will ask to focus students' thinking on the critical features of the task or to help students who are stuck), and How did you sort this group? Why did you sort this group in that way? Can you find another way to sort these objects?
- **Provide worthwhile extensions.** Groups should find 2 or more ways to sort objects. After each sort, students take a photograph on iPad and teacher should too just in case student photo is blurry) Continue to rotate groups to different objects so that they can continue to sort.

After: In this portion of the lesson, students should work as a community of learners, discussing, justifying, and challenging various solutions to the problem all have just worked on. Here is where much of the learning will occur. It is critical to plan sufficient time for a discussion and make sure the During portion does not go on for too long. Describe how you will accomplish each of the following:

- **Promote a mathematical community of learners** (Describe how the students will present their solution strategies. How will you organize the discussion to accomplish the mathematical goals? Which solutions will be shared and in what order?) Before presentations, meet with each group and discuss one or two sorts they can present to the class. Help each group choose what to share to have a multitude of different ways to sort objects. Groups present ways they have sorted the objects with photos. Students explain why they grouped these objects in that way? Each group can share one way they sorted objects. After all groups have shared one sort, students continue sharing another way they sorted their objects.
- **Listen actively without evaluation** (How will you respond to students' presentations of their solutions?) What kind of rules/ways did you used to guide you? What problems or issues did

your group run into? After presentations of this object did you think of another way you could sort these objects?

- **Make connections** (What questions will you ask to help students make sense of the mathematics, make connections, see patterns, and make generalizations?) Why did you sort these objects this way? What did you notice that was the same about these objects? What did you notice was different about these objects? Did you notice any patterns within the objects? How do we sort things in our own life? Why do we sort things?
- **Summarize main ideas** (How will you formalize the main ideas of the lesson? How will you reinforce appropriate terminology, definitions, or symbols?) What did you learn from the way that this group sorted their objects? Do you agree with the way they sorted those objects? Could you sort them in a different way using the same rules?

ASSESSMENT

Observe: As the teacher walks around they should be asking questions to gather information. Teacher should notice who seems to find many different sorts and who seems to find only a few. Notice if the rules seem to fit their sorts or not. Listen to students' justifications and whether it makes sense or not. Observe their photographs and listen to their understandings as they present.

Ask: How many different sorts did you make with these objects. Can you think of anymore? Why did you sort them in this way? How do you think these objects are similar? Different?