

KMC & Early Math Collaborative @Erikson
Bringing Math to Life in Early Childhood Classrooms

AGENDA

Session 1: Sets and Sorting

I. Greetings

II. Let's Do Math

III. Let's Talk About It

IV. What Does Learning Look Like?

V. Try and Apply: People Sort Research Lesson

Session 1 Note Sheet -A
CONSTRUCTING UNDERSTANDING OF ALGEBRAIC UNDERSTANDING: SETS
PERSONAL NOTE SHEET

Big Ideas about Sets	My notes, comments & examples
<ul style="list-style-type: none"> Attributes can be used to sort collections into sets. 	
<ul style="list-style-type: none"> The same collection can be sorted in different ways 	
<ul style="list-style-type: none"> Sets can be compared and ordered to show the relationship between them in terms of <ul style="list-style-type: none"> <i>more than,</i> <i>less than,</i> or <i>equal to</i> 	
Key Mathematical Terms about sets	
Attribute	
Set	
Binary sort	
Key Skills and Processes Used in working with Sets (What children do and say as evidence of learning)	
Observing	
Categorizing	
Naming	
Seriating/Ordering	

Big Ideas	Key Skills
<u>Attributes</u> can be used to <u>sort</u> collections into sets.	<u>Observe</u> and <u>name</u> characteristics or attributes of objects that are the same or different.
The same collection can be <u>sorted</u> in different ways.	Create many different <u>categories</u> depending on the attributes chosen.
Sets can be <u>compared</u> and <u>ordered</u> .	<u>Seriate/put in order</u> sets from most to least or biggest to smallest or can show that they are the same

Developmental Trajectory for Sorting

Activity Type	Example Materials
Exact Matching	<ul style="list-style-type: none"> Pairs of socks or mittens
Binary Sort	<ul style="list-style-type: none"> Observable attributes of clothes, appearance, etc.
Sorting on a Single Attribute	<ul style="list-style-type: none"> Collections of objects that share some attributes but differ with others— like the beads
Multiple Set Sort	<ul style="list-style-type: none"> Using counting critter of different types, sizes, and different colors
Compare Sets	<ul style="list-style-type: none"> Types of weather on calendar
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What Does Learning Look Like?

Educare Session 1 Note Sheet -B

CHILDREN: what do I see them saying and doing (include gestures) that is evidence they are developing understanding or are at a *Not Yet* stage.

TEACHER: What does the teacher say and do to help child develop understanding: include use of math terms, open-ended questions, modeling, echoing children's statements to confirm etc.

Video Clip 1 : Rock Sort

I am focusing on CHILDREN

TEACHER

Video Clip 2: Rock Sort

I am focusing on CHILDREN

TEACHER

PEOPLE SORT

Big Idea Focus: Attributes can be used to sort collections into sets. A collection can be sorted in many different ways.

In this lesson, children:

- Identify and describe observable attributes of children and clothing
- Physically form sets according to given attributes
- Use rules to sort and re-sort each other into sets using various attributes (KG goal)

Materials

- *Five Creatures* by Emily Jenkins
- Two large circles made with masking tape or yarn for children to stand in, or two hula-hoops
- Dress-up clothes (for children wearing school uniforms)

1. Review *Five Creatures* and Introduce Activity

Gather a group of about 10 children in an open space where you can place two tape circles or hula-hoops on the floor. Show children the book and remind them how the same five creatures were described in many different ways. Tell them that you are now going to use various descriptions to sort five of them into two different groups, or sets. Five children will form sets by standing in the hoops; other children will be the “audience.”

2. Sort and Re-sort Children

Choose easily observable attributes for sorting. For example,

- *I see five children on this rug. Some have curly hair [point to one hoop], and some have straight hair [point to other hoop].*
or
- *I see a child who is wearing a belt [point to one hoop], and some who are not [point to other hoop].*

Assist children as necessary to sort themselves into the two sets you have described. Have children in the

Planning Tips

Read *Five Creatures* at least once prior to this lesson.

It is best to introduce this activity with a **group of about 10 children**. Later, this is a good whole-group or transition activity. For example, call all children with tie shoes to line up, then children wearing shoes with straps.

Math Note

This lesson is an *open sort* in which the categories can include a wide range of attributes that must be identified and described by the sorter.

When you stop modeling and turn the sort over to the children, keep it open. If you tell them which attributes to use you will be doing a *closed sort*—though you should guide them with prompts and questions to be specific.

Most commercially available sorting materials have a *limited number of attributes*. This leads to a *closed sort* in which color and/or size are often the only possible categories.

Differentiation

For a challenge, sort children according to a *have/have not* rule. For example, group children who have on blue and children who do not have on blue. Help children see that children in the *have not* set are alike in that they are not wearing blue, though they may be wearing many different other colors.

audience “check” that each set of children shares the same attribute. Ask, *Why do these children belong together? What could we name the group?*

Sort children several more times using other directly observable attributes—color of shirt, type of shoes, wearing of glasses, and so on. (If children wear school uniforms, you can include dress-up clothes for greater variety.) Then, switch roles so that all children get to both be sorted and be in the audience.

3. Scaffold Children Sorting

Some children may now be ready to take on the role of the sorter. Choose a child to be the sorter; you become one of the people to be sorted.

Children may need support to think of attributes for sorting. Ask questions that help them notice observable attributes, such as, *Does everyone have long sleeves? Is anyone wearing short sleeves?* It is best to stick with binary attributes for sorting since it can be challenging for young children to use the same categories with more than 2 sets.

4. Close the Lesson

Remind children that groups of objects or people can be sorted and re-sorted in different ways. Tell them that you will make the hoops available so that they can play People Sort at center time.

Math Language Learning

Attribute words such as *long, straight, yellow, pointy*, and so on give children’s language greater precision. Be as specific as possible with the language you model for children.

For English Language Learners, consider the following strategies for this activity:

- Pair attribute words with gestures or props
- Accept children’s non-verbal participation
- Ask yes/no questions such as *Do you have a red shirt? Do you have a blue shirt?*

Observation

*How easy is it for children to **sort** themselves according to a given attribute?*

Can any children suggest new ways to sort the group? Do they change categories in the middle of sorting?

Do children have the vocabulary to name the attributes? How can this math lesson fold into language development?

Teacher as Learner

Most adults remember algebra as a high school course devoted to learning about equations containing variables. However, the foundations of algebraic thinking begin much earlier.

What do you remember about algebra in school? How do you think your memories influence your teaching of algebraic thinking today?

Connections to Literature: Using an Interactive Read-aloud to Spark Mathematical Thinking EXAMPLE

1. **Book Title/author:** *Five Creatures*, by Emily Morris
 - a. **Genre** (informational picture book? concept book? Story/narrative?) This is more of a concept book since it doesn't really tell a story.
 - b. **Type of illustrations** (Photographs? realistic illustrations? Playful illustrations?) The illustrations look a little like a child's drawings; they focus on details that the reader can point to and explain what the text says.
 - c. **Text density and Features of print** (*Is there a lot, a little or moderate amount of text? Are there any ways attention is drawn to the text by playing with size or position?*) Very little text; it is printed in curvy playful lines at the bottom of each page so the pictures really stand out.
2. **Where's the Math:** *Which of the big ideas about Sets could this book be used to trigger thinking about sorting and attributes? Discuss how the book invites the children to use observation, categorizing, and naming skills. The book really emphasizes that a collection can be sorted in many different ways, depending on the attribute(s) used. All the statements in the book are given in ways that make you observe the details of the pictures and then to explain the categories it talks about.*
3. **Making Connections:** *What is something you might say as you introduce the book that will focus the children's attention on thinking about sets and sorting? I would start by having them look at the cover picture and talk about who the "Five Creatures" are and why the title uses "creatures" instead of people. Then I would remind them of how we are all the same and different and say that this book is another way of looking at same and different.*
4. **Creating Conversations:** *Consider both the text and the illustrations as you develop at least three open-ended questions to use as you read through the book with the children. In what ways does this story invite children to develop think about naming attributes and categorizing? After I read the first few pages, I will stop and ask the children some ways the 5 creatures are the same and different. I will call on different children to point out details in the illustrations that show what the text is saying. At the end I will ask some children how many creatures are in their house and one way they are the same or different.*
5. **Bringing books to life:** *What kind of activities could you use to extend the book? I will refer back to it when doing People Sort*

Questions to Consider in the Planning the lesson

Lesson Plan: People Sort	INSTRUCTIONAL DECISIONS
What do you need to do beforehand about obtaining and/or preparing materials?	
What groupings are most appropriate for this activity in your classroom	
Learning Goals	
<ul style="list-style-type: none"> What specific <i>Big Idea</i> will this activity target? 	
<ul style="list-style-type: none"> What specific skill(s) is/are being targeted? 	
<ul style="list-style-type: none"> What data could be collected to show evidence of learning (what the children say, do, etc)? How will you collect it? 	
Challenges for Your Learners:	
What <i>concepts</i> might be challenging (consider the developmental trajectory and how much experience children have had with sorting.	
<p><i>Language Based Challenges:</i> What is the level of language development in your children? Will they need help naming attributes?</p> <p>What particular terms might they need help with?</p>	
Implementation Plan	INSTRUCTIONAL DECISIONS
<ul style="list-style-type: none"> Exactly how will you introduce the activity in your classroom? <ul style="list-style-type: none"> associate it with a book make connections to previous experiences How will you pace it? How might you repeat or vary it? 	
What are some <i>open-ended questions and prompts</i> you might ask that will get the children thinking and problem-solving	
Closure How will you help the children review the main points of the activity & refocus them on the learning goals you set for the lesson?	

Share Your Comments and Thoughts on Today's Sessions



FLOWER [I got it!]

BUD [I want to ponder it]

THORN [I'm confused or disagree]