MY BELIEFS ABOUT MATH
IN EARLY CHILDHOOD CLASSROOMS

A) *The joy of learning comes when children are allowed to play and discover the math that is all around us.*

B) *Giving young children extensive practice in counting to 100 gives them confidence that they know their numbers.*

C) *Having manipulatives that children can choose during "center time" provides them with concrete experiences with math.*

I chose statement _____

My Partner chose statement _____

Take Notes on what your partner said …….

SHOE GRAPH

Big Idea Focus: The main purpose of collecting data is to answer questions when the answers are not immediately obvious. It is useful to compare parts of the data and to draw conclusions about the data as a whole.

In this lesson, children:

- Identify and describe attributes of shoes
- Sort shoes by attributes
- Represent data using real objects (shoes) and sticky notes
- Count and compare data on a graph to answer questions

Materials

- Nonfiction book with photographs of shoes (see **Book Connections** for suggestions)
- White shower curtain or tablecloth
- Masking tape or permanent marker
- Large sticky notes
- Chart paper

PART 1: CONSTRUCTING A "REAL GRAPH"

1. Discuss Types of Shoes and Sort Shoes

Gather the whole class to read aloud a nonfiction book with photographs of shoes. After discussing different types of shoes depicted in the book, ask children to consider their own shoes.

- *What kind of shoes are you wearing today?*
- *If we made a book about the kinds of shoes in our class, how could we organize all the shoes?*

Suggest that each child remove one shoe to create a collection of shoes to sort into categories. Allow children to suggest the categories for sorting. You might prompt them by asking, *What is the same? What is different?* As a group, agree on one way to sort the shoes, such as type of shoe. For example, the categories might be gym shoes, dressy shoes, and boots.

Have children group shoes into piles according the categories they have chosen.

2. Introduce a "Real Graph"

Show children the floor grid you created and explain that it can be used to organize the pile of shoes. Use sticky notes to label the columns by category. Have children place the shoes on the grid. Watch for opportunities to help children discover basic graphing concepts (see **Math Note**.)

Planning Tips

This lesson has two parts to be done on different days with the **whole class**.

Prepare a reusable floor grid using a white shower curtain or plastic tablecloth marked with masking tape or permanent marker. Make about 5 columns by 9 rows. Grid spaces should all be the same size and large enough to fit a child's shoe.

Book Connections

> *Shoes, Shoes, Shoes* by Ann Morris

> *Whose Shoes?: A Shoe for Every Job* by Stephen R. Swinburne

> *Whose Shoe?* by Margaret Miller

Facilitation Tip

Allowing children to define their own shoe categories involves them in making sense of a problem and persevering in solving it, and constructing viable arguments and critiquing the reasoning of others. However, it can be a challenge to arrive at consensus in a large group.

Consider using "Turn and Talk" or another strategy to give all children a chance to share their thinking. You may want to make a list of children's suggestions.

Math Note

A "**real graph**" is a concrete data display using real objects. As children actively construct the graph, you can help make explicit basic graphing concepts, including:

- Each column begins at the line (***axis***)
- One object per grid space
- No skipping grid spaces

3. Use Data to Answer Questions

Help children analyze the graph. Make sure your questions ask children to compare parts of the data and to draw conclusions about the data as a whole. For example,

- *Is there more of one kind of shoe than another?*
- *What kind of shoe do we have the most of? least of?*
- *Why do you think we have more __ shoes than ___ shoes?*
- *Do you think the graph would be the same on a rainy/snowy/hot day? How might it be different?*
- *What should we name this graph? Why is that a good name?*

PART 2: CONSTRUCTING A PICTOGRAPH

1. Repeat the Shoe Graph

On a different day, have children sort their shoes on the floor grid using the same categories as before. Ask children to compare the two graphs:

- *Do we have the same kinds of shoes we had when we did this before?*
- *How is this graph the same? How is it different?*

Point out that it may be hard to compare graphs because the first data display no longer exists.

2. Introduce a Pictograph

Ask children for ideas about making a more permanent graph. If no one mentions it, suggest drawing pictures. Give each child a large sticky note on which to draw his or her shoe. You may want to have children draw all at once, or in small groups during center time. When the shoe drawings are ready, help children place their sticky notes on a chart paper labeled with the same categories as the real graph.

3. Compare Data Displays

Have children help you label the pictograph with a title and date. Ask children how the pictograph is alike and different from the real graph. Discuss what the pictures stand for on the pictograph and how both data displays show the same information.

Ask children whether the graph suggests any other questions to explore. Tell children that you will keep their graph to look at another day.

Facilitation Tip

A good rule of thumb is to plan on spending more time in the **discussion** of the graph than on its construction.

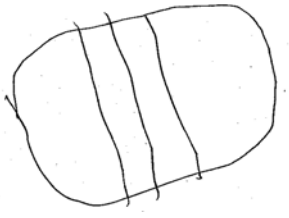
Observation

Are children able to get information from the graph to answer your questions?

Do they have their own questions about the data?

Math Note

Mathematical drawings need not show details, but should illustrate the mathematics in the problem. In this case, children's shoe drawings can be simple but should represent, in some way, the attribute of its category (laces versus straps, for example). You may want to model a drawing for children.



A shoe with straps drawn by a 4-year old child

NOTE CATCHER FOR OBSERVING A PLANNING SESSION

1. *How were the teacher's Attitudes & Beliefs about math/teaching math addressed & acknowledged?*
2. *What kind of guiding questions were used by the coach? What evidence do you see that the coach was responding to what the teacher said?*
3. *How were logistics addressed?*
4. *What focus for data collection was established; how was it arrived at?*

In the Video	

Activity Plan

Date _____

Teacher _____ **Grade:** _____

School _____

Completed by:

☐ **Teacher**

☐ **Teacher & Coach**

Related Book (title/author)

NCTM Content Standards (check one or more)

- ☐ Number and Operations
- ☐ Algebra
- ☐ Geometry
- ☐ Measurement
- ☐ Data Analysis and Probability

NCTM Process Standards (check one or more)

- ☐ Problem Solving
- ☐ Reasoning and Proof
- ☐ Communication
- ☐ Connections
- ☐ Representation

What **Big Idea** will children explore?

What **Learning Standard/Objective** will be addressed?

Format Used

☐ Whole group ☐ Small group ☐ Centers/Free choice

Grade: _____

Materials:

Procedure:

Key Words:

Questions to **assess understanding**:

Ideas to provide **support** or **challenge**:

Day 1 Reflections

- What was said or done today that . . .
  …Surprised you?
  …Delighted you?
  …Challenged you?
- What might you take back into your practice?
- Do you have any lingering questions or other thoughts you would like to share with us?

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