

### Early Numeracy

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Background material for this presentation is primarily drawn from the: "The Head Start Leaders Guide to Positive Child Outcomes"

### Numbers in our lives...

- Think about getting to this meeting today. Were there any numbers or math concepts involved in the process? What were they?
- Turn to a partner. Share a favorite activity. Together, list at least three ways numbers or math are involved in each of your activities.

### Numbers in children's lives

Math Curse by Jon Scieszka & Lane Smith



# Numbers in young children's lives





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## What is early **numeracy**?

**Numeracy** is a portmanteau\* of "numerical literacy." It refers to the ability to reason with numbers and apply mathematical concepts.

**Early** numeracy refers to the foundations of mathematical reasoning, acquired in early childhood.

\*The original meaning of the word 'portmanteau', is a type of suitcase containing two separated hinged compartments. Lewis Carroll first used the term to describe a a word formed by blending sounds from two or more distinct words and combining their meanings. His poem "Jabberwocky" is full of portmanteaus.

Why is early numeracy important?

Because mathematics...

- helps children observe, organize and find meaning in their environment
- focuses on reasoning, connecting ideas and thinking logically – important tools children can use to make sense of their world
- relates to other curriculum areas, such as science, social studies, art and music



And...

# Math knowledge, interest, and skill are basic to children's success in school.



According to the National Council of Teachers of Mathematics (NCTM)...

- Learning about math is neither shortterm nor rote.
- Children need to manipulate objects and explore math concepts in a materials-rich environment.

According to the National Council of Teachers of Mathematics (NCTM)...

- Technology, if used age appropriately, can be one component of early math education.
- Children need time and freedom to construct, test, and reflect on their ideas about math.

According to the National Council of Teachers of Mathematics (NCTM)...

- Natural conversations with adults help children extend their thinking about math
- Activities/concepts should be grounded in the familiar and everyday

According to the authors of "Mathematical Language in Early Childhood Settings: What Really Counts?" \*

- Language is an important tool for teaching mathematics.
- People who work with young children are not using enough mathematical language, especially language that goes beyond the most basic concepts.

According to the authors of "Mathematical Language in Early Childhood Settings: What Really Counts?" \*

- The most effective mathematics instruction occurs when people working with children take a "playful approach."
- We need to "stack the deck" so that children have a wealth of opportunities to encounter interesting mathematics.

### In other words...

We support young children's numeracy development when we purposefully introduce and use mathematical language and concepts during enjoyable activities and every day experiences. Some people call this process "mathematizing."

Mathematical language and concepts for young children fall into three main categories

### Numbers and operations

### Geometry and spatial sense

#### Patterns and measurement

### Numbers and operations

- Number sense involves the ability to think and work with numbers and to understand their uses and relationships.
- "Operations" is the formal mathematical term referring to addition, subtraction, multiplication, and division of numbers.



# Children learning about numbers and operations...



- demonstrate increasing interest in and awareness of numbers and counting as a means of solving problems and determining quantity
- Begin to associate number concepts, vocabulary, quantities, and writing numerals in meaningful ways

Children learning about numbers and operations...

- Develop increasing ability to count in sequence to 10 and beyond
- Begin to make use of oneto-one correspondence in counting objects and matching groups of objects



# Children learning about numbers and operations...



- Begin to use language to compare numbers of objects with terms such as more, less, greater than, fewer, equal to
- Develop increased abilities to combine, separate and name "how many" concrete objects

Numbers and operations: Opportunities to Mathematize

- Encourage children to count all sorts of objects and events and to think about quantity and number.
- Involve children in
  - matching and sorting objects
  - using one-to-one correspondence
  - ordering objects that vary in color, size, or other dimensions



#### Numbers and operations: Opportunities to Mathematize



- Draw attention to numbers and how they are used such as addresses, prices of objects and shoe sizes.
- Use strategies that help children learn to count accurately and efficiently such as pointing to/touching/moving each object being counted.

Numbers and operations: Opportunities to Mathematize

- Talk about the parts that make up a whole - a concept that underlies addition and subtraction.
- Use words related to estimation – more than, less than, about, nearly, approximately, and in between.



#### Numbers and operations: Opportunities to Mathematize



- Ask children to estimate how much, how long or how many.
  Encourage them to test for the actual answer
- Play games that include counting and using numbers (Simon Says, simple board, card or dice games, hopscotch)

## **Geometry and Spatial Sense**

- Geometry is the area of mathematics that involves shape, size, space, position, direction and movement. It helps describe and classify the world we live in.
- Spatial sense gives children an awareness of themselves in relation to people and objects.

Children who are learning about geometry and spatial sense...

- Begin to recognize, describe, compare, and name common shapes, parts and attributes.
- Progress in the ability to put together and take apart shapes.
- Begin to be able to determine whether or not two shapes are the same size and shape.





Children who are learning about geometry and spatial sense...

Show growth in

- matching,
- sorting,
- putting in a series,
- and regrouping



objects according to one or two attributes such as color, shape, or size.

Children who are learning about geometry and spatial sense...

Build an increasing understanding of

- directionality, order and position of objects and
- words such as up, down, over, under, top, bottom, inside, outside, in front and behind.





- Encourage children to identify different shapes as they draw, look at books, work with puzzles, build with blocks or take a walk.
- Give children many opportunities to handle objects such as blocks, boxes, containers, shape sorters and puzzles.

- Encourage children to climb in and out of boxes or large block structures, on or around outdoor equipment, and over, under, around, through, into, on top of, and out of different things to experience themselves in space
- Repeat the above with a toy person or animal.



- Encourage children to make new shapes by putting materials together and taking them apart in different arrangements. They can do this by
  - cutting and folding paper
  - molding clay
  - playing with blocks





Introduce spatial vocabulary, including

- location and position words on/off, over/under, in/out, above/below, in front/in back...
- movement words up/down, forward/backward, toward/away from, straight/curving...
- distance words near/far, close to/far from, shortest/longest...

### Patterns and Measurement



- Understanding and identifying patterns and relationships means recognizing rhythm and repetition as well as sorting, categorizing, and ordering from shortest to longest, smallest to largest.
- Measurement is an important way for young children to look at relationships in the real world – length, height, weight, time.

Children who are learning about patterns and measurement...

- Enhance their abilities to recognize, duplicate, and extend simple patterns using a variety of materials.
- Show increasing abilities to match, sort, put in a series, and regroup objects according to one or two attributes such as shape and size.



# Children who are learning about patterns and measurement...



- Begin to make comparisons between several objects based on one or two attributes
- Show progress in using standard and non-standard measures for length and area of objects

- Increase awareness of patterns. Help children find patterns in
  - designs and pictures,
  - movements,
  - reoccurring events.
- Engage children in creating and noticing patterns as they play.



Let children figure out their own units for measurement. Children better understand standard units like inches, feet, and yards when they have lots of experiences working with their own ways of measuring and comparing.



- Involve children in activities such as block building, cooking, crafts, science experiments and other experiences that involve measurement.
- Look for opportunities to help children make comparisons and measurements of volume, height, weight, length, and temperature.



- Provide simple experiences that help children begin to develop and understanding of time concepts...
  - time events by counting out seconds
  - compare how long different activities take
  - start with daily time references (after the story, before lunch) and progress to more abstract concepts (yesterday, tommorow, months, years, etc.



- Use simple charts and graphs to help children practice number skills and make comparisons.
  Capitalize on children's interest in comparing all sorts of things about themselves. Try charting things like...
  - favorite foods or colors
  - eye/hair color
  - types of pets



### Mathematizing "The Mitten"



#### Jan Brett's website:

### http://www.janbrett.com/





- Choose a book and consider it's "mathematizing" potential.
- Identify opportunities to discuss and explore
  - number and operations,
  - geometry and spatial sense and/or,
  - patterns and measurement.
- Brainstorm story-related, hands on, concrete numeracy activities.

## Storytime Ideas: Small Groups

- Find four other pairs to make a small group of ten.
- Each pair should briefly present their book and the "mathematized" discussion and activities it stimulated.
- Each small group should identify one unique idea they'd like to share with the whole group.

### Storytime Ideas: Whole Group

# Share a unique "mathematized" storytime activity and its related book.



Thank you!

## Go forth and "mathematize"!



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