Math is Everywhere: Supporting Math Skills in Infants and Toddlers

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Webinar Features

BabyTalks

Slide Deck   Question & Answers   Webinar Tips

Help   Media Player   Resource List   Group Chat

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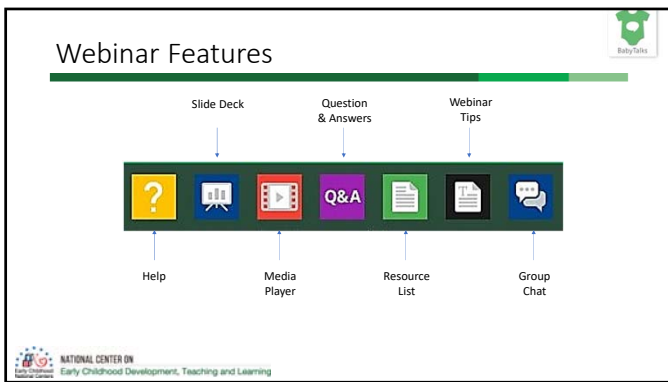Early Childhood Development, Teaching and Learning

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Finding the Math in Your Day

What have you done today that involves math?

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Session Objectives

At the end of this webinar, you should be able to:

1. Identify ways infants' and toddlers' play and routines build informal foundations for math

1. Describe how math is integral to learning in all domains of the ELOF.

2. Design activities and strategies for scaffolding and supporting early math skills in what children already do every day.

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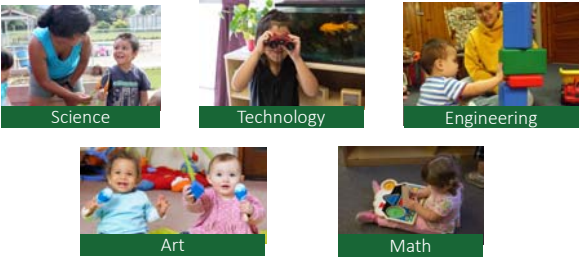
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Session Agenda

Here's what we're doing today:

1. Discuss why it's important to foster math skills beginning in infancy.
2. Describe math skill and concepts children learn as infants and toddlers and how they support school readiness across the ELOF domains.
3. Share activities and strategies for scaffolding and supporting children as they build math skills.
4. Provide an overview of four key effective practices for supporting early math learning.
5. Closing thoughts.
6. Resources and support.

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STEAM: Thinking, Creating, Problem Solving

Science

Technology

Engineering

Art

Math

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School Readiness

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ELOF Math and the ELOF

Five domains of the ELOF for infants and toddlers:

- Perceptual, Motor, and Physical Development
- Social and Emotional Development
- Language and Communication
- Cognition
- Approaches to Learning

Head Start Early Learning Outcomes Framework

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ELOF Cognition

Infant/Toddler Cognition Sub-Domains

| Exploration and Discovery | Memory | Reasoning and Problem-Solving | Emergent Mathematical Thinking | Imitation and Symbolic Representation and Play |

Goals for Sub-Domain: Emergent Mathematical Thinking

Goal IT-C 8. Child develops sense of number and quantity.

Goal IT-C 9. Child uses spatial awareness to understand objects and their movement in space.

Goal IT-C 10. Child uses matching and sorting of objects or people to understand similar and different characteristics.

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ELOF Cognition – Sense of Number and Quantity

Goals for Sub-Domain: Emergent Mathematical Thinking

Goal IT-C 8. Child develops sense of number and quantity.

| Developmental Progression | Indicators |

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ELOF Cognition – Sense of Number and Quantity

Goals for Sub-Domain: Emergent Mathematical Thinking

Goal IT-C 8. Child develops sense of number and quantity.

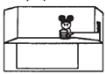| Developmental Progression	Indicators
Birth to 9 Months	
Attends to quantity in play with objects, such as reaching or looking for more than one object.	

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Infants' Early Understanding of Number

1. Object placed in case

Wynn, 1992
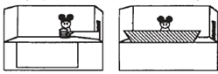
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Infants' Early Understanding of Number

1. Object placed in case   2. Screen comes up

Wynn, 1992

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Infants' Early Understanding of Number

1. Object placed in case 2. Screen comes up 3. Second object added

Wynn, 1992

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Infants' Early Understanding of Number

1. Object placed in case 2. Screen comes up 3. Second object added 4. Hand leaves empty

Wynn, 1992

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Infants' Early Understanding of Number

1. Object placed in case 2. Screen comes up 3. Second object added 4. Hand leaves empty

Then either : possible outcome
5. Screen drops... revealing 2 objects

1 + 1 = 2
Possible

Wynn, 1992

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Infants' Early Understanding of Number

1. Object placed in case 2. Screen comes up 3. Second object added 4. Hand leaves empty

Then either : possible outcome   or : impossible outcome
5. Screen drops... revealing 2 objects   5. Screen drops... revealing 1 object

1 + 1 = 2   1 + 1 = 1
Possible   Impossible   *Wynn, 1992*

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ELOF ▶ Cognition – Sense of Number and Quantity

Goals for Sub-Domain: Emergent Mathematical Thinking

Goal IT-C 8. Child develops sense of number and quantity.

	Developmental Progression	Indicators
Birth to 9 Months	8 to 18 Months	
Attends to quantity in play with objects, such as reaching or looking for more than one object.	Uses a few basic words to refer to change in the amount of objects, such as asking for "more" or saying "all gone" when a plate is empty.	

Toddler is signing "all done".

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ELOF ▶ Cognition – Sense of Number and Quantity

Goals for Sub-Domain: Emergent Mathematical Thinking

Goal IT-C 8. Child develops sense of number and quantity.

	Developmental Progression		Indicators
Birth to 9 Months	8 to 18 Months	16 to 36 Months	
Attends to quantity in play with objects, such as reaching or looking for more than one object.	Uses a few basic words to refer to change in the amount of objects, such as asking for "more" or saying "all gone" when a plate is empty.	Uses language to refer to quantity, such as using some number words or signs to identify small amounts, or using other words referring to quantity, such as a little, too much, or a lot.	

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ELOF — Cognition – Sense of Number and Quantity

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Goals for Sub-Domain: Emergent Mathematical Thinking

Goal IT-C 8. Child develops sense of number and quantity.

Developmental Progression			Indicators
Birth to 9 Months	8 to 18 Months	16 to 36 Months	By 36 Months
Attends to quantity in play with objects, such as reaching or looking for more than one object.	Uses a few basic words to refer to change in the amount of objects, such as asking for "more" or saying "all gone" when a plate is empty.	Uses language to refer to quantity, such as using some number words or signs to identify small amounts, or using other words referring to quantity, such as a little, too much, or a lot.	• Counts small number of objects (two or three), sometimes counting the same object twice or using numbers out of order. • Identifies "more" or "less" with a small number of items without needing to count them. • Uses fingers to show how old they are.

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Slide 23

Early Number Development

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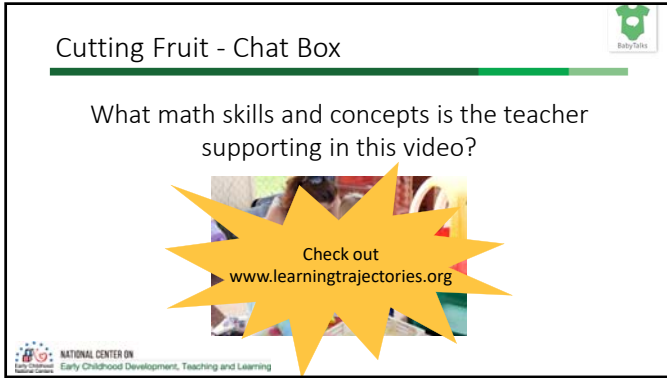
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Cutting Fruit - Video

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Cutting Fruit - Chat Box

What math skills and concepts is the teacher supporting in this video?

Check out
www.learningtrajectories.org

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ELOF **Cognition – Spatial Awareness**

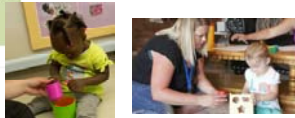Goal IT-C 9. Child uses spatial awareness to understand objects and their movement in space.

Developmental Progression	Indicators
Birth to 9 Months	
Explores or examines objects and watches objects when they move.	

You crawled **through** the tunnel!

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ELOF **Cognition – Spatial Awareness**

Goal IT-C 9. Child uses spatial awareness to understand objects and their movement in space.

Developmental Progression		Indicators
Birth to 9 Months	**8 to 18 Months**	
Explores or examines objects and watches objects when they move.	Explores how things fit together, how they fit with other things, and how they move through space, such as a ball thrown under a table.	

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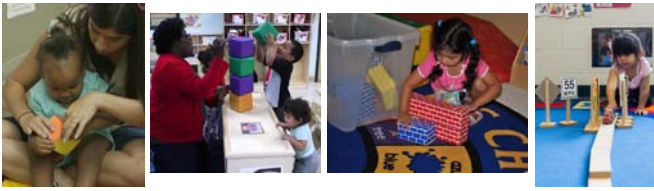Early Childhood Development, Teaching and Learning

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Spatial Awareness – Open-Ended Materials

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Spatial Awareness – Video

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Spatial Awareness – Video Recap

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ELOF ▸ Cognition – Spatial Awareness

Goal IT-C 9. Child uses spatial awareness to understand objects and their movement in space.

Developmental Progression			Indicators
Birth to 9 Months	8 to 18 Months	16 to 36 Months	By 36 Months
Explores or examines objects and watches objects when they move.	Explores how things fit together, how they fit with other things, and how they move through space, such as a ball thrown under a table.	Predicts or anticipates how things move through space, or fit together or inside other things, such as putting smaller objects into a small box and larger objects into a large box.	• Does puzzles with interlocking pieces, different colors, and shapes. • Understands some effects of size or weight when picking up or moving objects.

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Block Play

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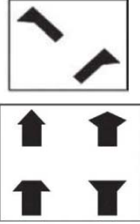
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Puzzle Play

Research shows we can see benefits from early spatial play years later.

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Benefits of Spatial Play

Early Puzzle Play

Spatial Game

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Levine, Ratliff, Huttenlocher, & Cannon, 2012

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ELOF ▸ Cognition – Matching and Sorting

Goal IT-C 10. Child uses matching and sorting of objects or people to understand similar and different characteristics.

Developmental Progression	Indicators

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ELOF ▸ Cognition – Matching and Sorting

Goal IT-C 10. Child uses matching and sorting of objects or people to understand similar and different characteristics.

Developmental Progression	Indicators
Birth to 9 Months	
Explores or examines differences between familiar or unfamiliar people or between different types of objects, such as by mouthing or shaking a toy.	

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ELOF ▸ Cognition – Matching and Sorting

Goal IT-C 10. Child uses matching and sorting of objects or people to understand similar and different characteristics.

Developmental Progression		Indicators
Birth to 9 Months	8 to 18 Months	
Explores or examines differences between familiar or unfamiliar people or between different types of objects, such as by mouthing or shaking a toy.	Matches objects by similar or related characteristics, such as matching shapes with openings in a shape-sorting box or by putting a toy bottle with a baby doll.	

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ELOF ▸ Cognition – Matching and Sorting

Goal IT-C 10. Child uses matching and sorting of objects or people to understand similar and different characteristics.

Developmental Progression			Indicators
Birth to 9 Months	8 to 18 Months	16 to 36 Months	By 36 Months
Explores or examines differences between familiar or unfamiliar people or between different types of objects, such as by mouthing or shaking a toy.	Matches objects by similar or related characteristics, such as matching shapes with openings in a shape-sorting box or by putting a toy bottle with a baby doll.	Sorts objects into two groups based on a single characteristic, such as grouping toy animals separately from toy cars, or putting red socks and white socks in different piles.	• Sorts toys or other objects by color, shape, or size. • Orders some objects by size. • Identifies characteristics of people, such as "Mom has black hair like me."

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Sorting Activities – Chat Box

What are some ways you can encourage sorting using everyday objects?

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Shape Scavenger Hunt

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Shape Scavenger Hunt - Video

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ELOF Cognition (Preschoolers) - Measurement

Mathematics Development Sub-Domain: Measurement

Goal P-MATH 8. Child measures objects by their various attributes using standard and non-standard measurement. Uses differences in attributes to make comparisons.

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Measurement in Infants and Toddlers

What does measurement look like in infants and toddlers?

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ELOF Cognition (Preschoolers) - Patterns

Mathematics Sub-Domain: Operations and Algebraic Thinking

Goal P-MATH 7. Children understand simple patterns.

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Patterns: Daily Routines

Turn on water | Wet hands | Get soap | Wash hands | Rinse hands | Turn off water | Get towel | Throw towel away

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Patterns: Music and Rhythm

Listening and moving to music may help young children build pattern recognition skills.

Zhao & Kuhl, 2016

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Math Learning Happens Across Domains

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Approaches to Learning	Social and Emotional	Language and Literacy	Perceptual, Motor, Physical
Goal IT-ATL-6. Child demonstrates emerging initiative in interactions, experiences, & explorations	Goal IT-SE 12. Child shows confidence in own abilities through relationships with others	Goal IT-LC 7. Child understands an increasing number of words used in communication with others	Goal IT-PMP 5. Child uses sensory information & body awareness to understand how their body relates to the environment

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Finding the Math

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Finding the Math

Measurement
Shapes
Patterns/Routines

Shapes

Spatial Language

Spatial Language

Shapes
Spatial
Matching

Patterns
Shapes

Sense of
Number

Sense of Number
Spatial Awareness
Math Talk

Sense of Number
Spatial
Matching

Routines
Spatial

Spatial

Shapes

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Effective Practices for Building Math Skills

Responsive

Language

Family Engagement

Everyday Experiences

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Responsive Learning Environments

Responsive

Daily Schedule / Horario

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Math Talk

Language

You're walking **on** the path. Let's go **down** the steps. One step, two step.

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Make the Home the Learning Environment

Family Engagement

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Math is All Around

Everyday Experiences

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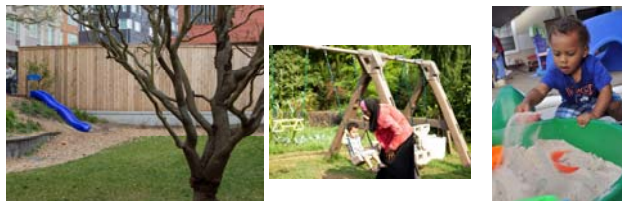
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Math at Meals

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Math Outside

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Math in Books

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Everyday Items Around the House

Household Items to Support Math at Home

Shoe Boxes
Cut holes of varying sizes in the lid of a shoe box and have your child place blocks or toys in the holes, while your child experiments with size and shapes.

Plastic Containers
Fill plastic containers (cups or Tupperware) of different sizes with water or sand. Do this in the sink, bath, outside, or in the sandbox. Your child can compare weight, size, and volume using comparison and measurement.

Egg Carton Sorting
Egg cartons can be used to help sort items. Make sure the items are large enough so they are not a choking hazard. Collect items in the home or from a walk and sort by item, size, shape, or color while counting. This develops patterning, measure-

Learning Trajectories: https://www.learningtrajectories.org/

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Building Math Skills From the Start

Remember to keep these effective practices in mind as you find more ways support children's early math learning throughout the day.

Responsive

Language

Family Engagement

Everyday Experiences

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Thank you!

Please fill out this survey.

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Resources and Support

- Understanding STEAM and How Children Use It: https://eclkc.ohs.acf.hhs.gov/publication/understanding-steam-how-children-use-it
- Math Learning Trajectories: https://eclkc.ohs.acf.hhs.gov/school-readiness/article/math-learning-trajectories
- Learning and Teaching with Learning Trajectories [LT]2: https://www.learningtrajectories.org/
  - Household Items to Support Math at Home: https://www.learningtrajectories.org/sites/default/files/inline-files/Household%20Items%20Handout_13.pdf
- STEAM 15-minute in-service suite: https://eclkc.ohs.acf.hhs.gov/school-readiness/article/steam
- High Five Mathematize: https://eclkc.ohs.acf.hhs.gov/publication/high-five-mathematize
- Finding the Math: https://eclkc.ohs.acf.hhs.gov/school-readiness/article/finding-math
- News You Can Use: Supporting Early Math Learning for Infants and Toddlers: https://eclkc.ohs.acf.hhs.gov/school-readiness/article/news-you-can-use-supporting-early-math-learning-infants-toddlers
- ELOF Effective Practice Guides: https://eclkc.ohs.acf.hhs.gov/school-readiness/effective-practice-guides/effective-practice-guides
  - Emergent Mathematical Thinking: https://eclkc.ohs.acf.hhs.gov/school-readiness/effective-practice-guides/emergent-mathematical-thinking

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Resources and Support

- Early Learning and School Readiness: Cognition Development and General Knowledge Tip Sheet: https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/ts-cognition-development-eng.pdf
- Research Notes: Little Scientists: https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/little-scientists.pdf
- Head Start Early Learning Outcomes Framework (ELOF): https://eclkc.ohs.acf.hhs.gov/hslc/hs/sr/approach/elof
- ELOF2GO Mobile App: https://eclkc.ohs.acf.hhs.gov/school-readiness/article/elof2go-mobile-app
- Classroom Visuals & Supports: https://eclkc.ohs.acf.hhs.gov/children-disabilities/article/classroom-visuals-supports
- Planned Language Approach (many resources within PLA, but a few highlighted below): https://eclkc.ohs.acf.hhs.gov/culture-language/article/planned-language-approach
  - Tip Sheet - Creating Environments That Include Children's Home Languages and Cultures: https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/dll-creating-environments.pdf
  - Tip Sheet - Including Children's Home Languages and Cultures: https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/dll-childrens-home-languages.pdf

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