

# Virtual Lab School



Welcome!

Live Webinar will begin at 11:00 EST

# Promoting Meaningful Math Experiences in Child & Youth Programs

May 13, 2026

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## To support your learning...

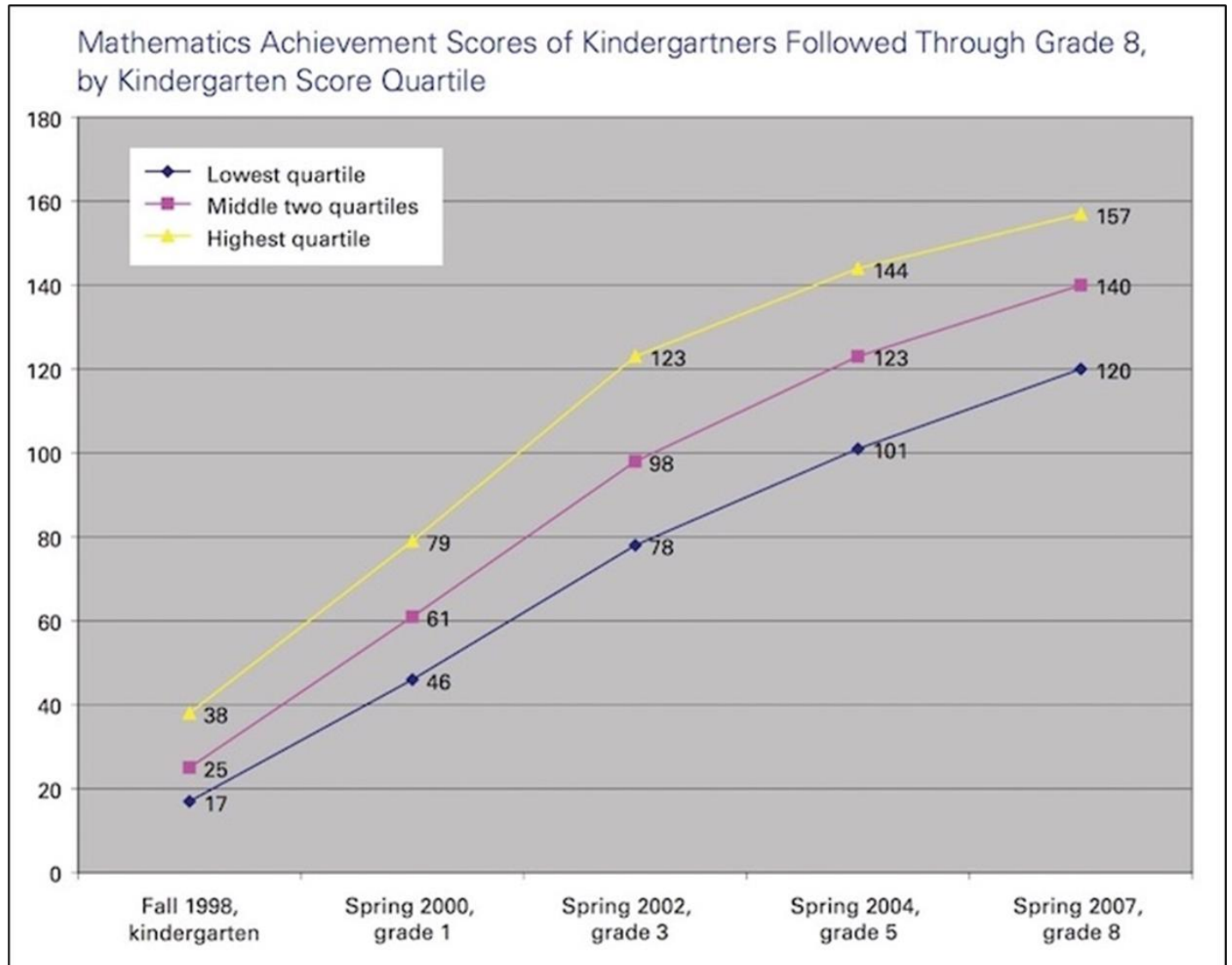
- ✓ All participants have been muted
- ✓ Please type questions or comments into Chat
- ✓ We will monitor the CHAT and answer questions throughout the training
- ✓ This session is being recorded to share on the Virtual Lab School site
- ✓ We encourage you to participate in the polls throughout the training
- ✓ Share your feedback after the training!
- ✓ If we disconnect – please log back in

# LEARNING OBJECTIVES

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- Understand why high-quality, meaningful math experiences matter for children and youth.
- Explore evidence-based research on early math development.
- Identify strategies for integrating math across daily routine, environments, and interactions.
- Learn about VLS tools and resources that can help strengthen math experiences.

# Why Math Matters



(chart from Schoenfeld & Stipek, 2011; see also Davis-Kean et al., 2022, Claessens et al., 2013, Jordan et al., 2010, Watts et al., 2014)

# Early Exposure

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Infants innate number sense is associated with math achievement, number word knowledge, and approximate number system functioning at three years of age.

(De Hevia, 2016; Starr et al., 2013)



# 5 Guiding Principles for Early Math Learning Experiences

- Focus on curiosity
- Use math language throughout the day
- Think about way to mathematize everyday interactions
- Build connections to home: [Center for Family Math](#)
- Pair math experiences with children's literature

(National Association for the Education of Young Children, 2022)



# **Math Mindset**

is defined by how  
children and youth:

- believe they are capable of doing math
- see themselves as mathematicians
- feel recognized by others as “math people”
- see math as meaningful and relevant to their lives

(Davey et al., 2025; Watts et al., 2015)

# Adult attitudes toward math profoundly shape children's early confidence and achievement



# Formal Math Experiences



Early Learning Matters Curriculum



4-H & Boys and Girls Club of America Activities



K-12 Math Lessons

“

*Two children (both two years old) are playing with a box. They take everything out of the box and climb into it; they jump and laugh. Their friends' look over, smile and run towards the two children. They stand in the box and start to sit down. They try to squeeze into the box but there isn't enough room for their legs. At first, the children kick each other. After a few minute, they work out how to position all four legs inside the box. [The problem is solved], and they laugh again. A third child starts to climb into the box. One of the children already inside the box shakes her head and says firmly, "No place, no place."*

”

# Why Informal Math Matters

- Engages children's bodies and activates their senses
- Builds on connection to their everyday lives
- Occurs throughout the day
- Builds flexible problem-solving

(Cohrssen et al., 2016; Franzen, 2021; Teaching Strategies, 2021)



# Math in Everyday Experiences



Language



Hands-On Experiences



Environmental Design



Routines



Responsive Interactions



Across Domains

# Math Language

## Model Language

- “You have **more** blocks than I do. I have two and you have four.”
- “You turned the puzzle piece, or **rotated** it, until it fit.”
- “I notice a **pattern** here— what do you notice?”

## Reinforces Habits & Skills

- “What do you **notice** about these two things?”
- “This is tricky, and that’s okay. Let’s **keep trying**.”
- “What is **another way** we could **solve** this problem?”

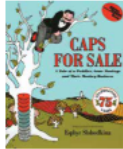
# Math in Storybook

Picture books can support children's math thinking and introduce basic concepts like:

- Numbers
- Shapes
- Patterns
- Measurement

NAEYC, 2022; DREME, 2026

<https://www.naeyc.org/resources/pubs/tyc/oct2017/now-read-these-books-bring-math-life>



*Caps for Sale: A Tale of a Peddler, Some Monkeys and Their Monkey Business*

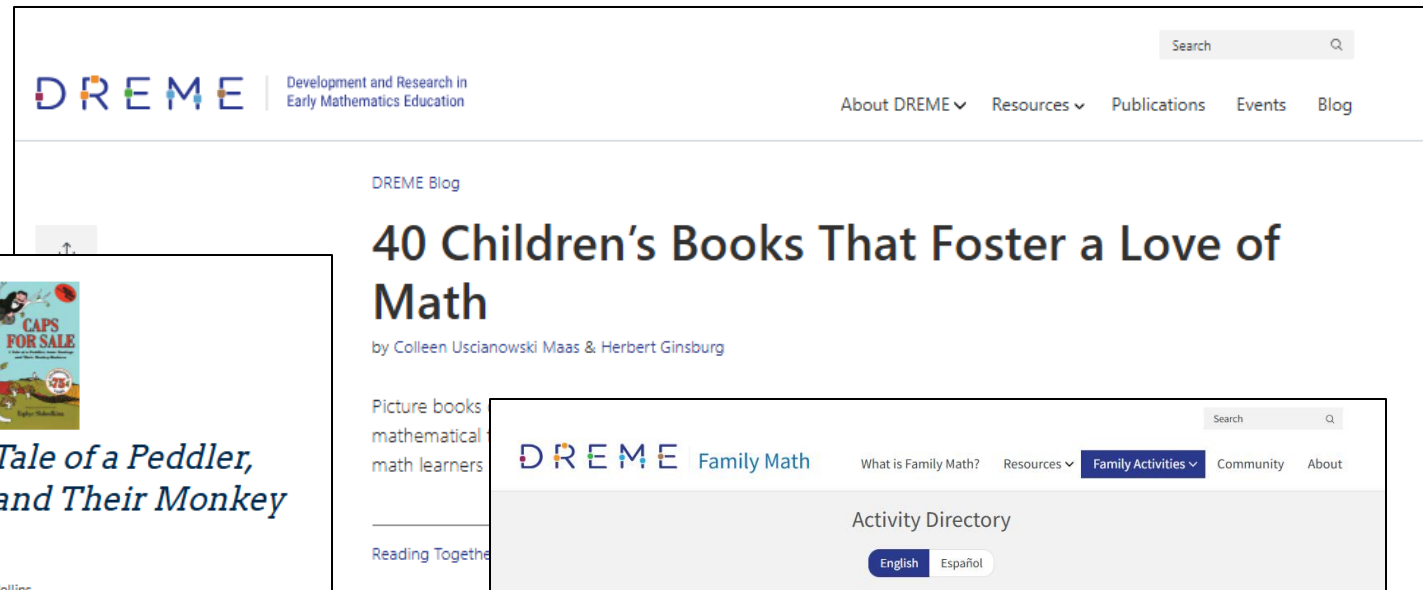
by Esphyr Slobodkina. [1940] 1987. HarperCollins.

This book might not look like it contains math concepts, but it actually has math for all kinds of monkey business! If you can, use the big-book version to help bring out the math ideas.

Try This:

Begin with a picture walk—previewing the pictures in a storybook to familiarize children with the story before reading. Point out how many caps the peddler has (four of each color, plus his own checked cap). Ask the children to explain what they think happened while he was asleep. Be sure to help them see that each monkey has one cap (this is one-to-one correspondence!). Return to the illustration of the peddler falling asleep with caps stacked on his head and the next picture showing the monkeys in the tree. Count the caps of each color and ask, "If the man had four brown caps when he fell asleep, how many monkeys in the tree are wearing brown caps?" Let children come up to the book so they can point to the caps as they count them.

This is another great story to act out. First, have each child make caps out of paper plates (you can find easy-to-follow directions online). Be sure to use only three or four colors. You can play the cap seller and stack all the caps, then pretend to sleep. Let the children, acting as the monkeys, tiptoe up, steal a cap, and move to the other side of the rug. Go through the fist-shaking, foot-stomping routine of the peddler while children play the parts of the monkeys. At the end, have the children sort themselves into groups by the color of their caps. Count how many are in each group and how many there are altogether.



DREME | Development and Research in Early Mathematics Education

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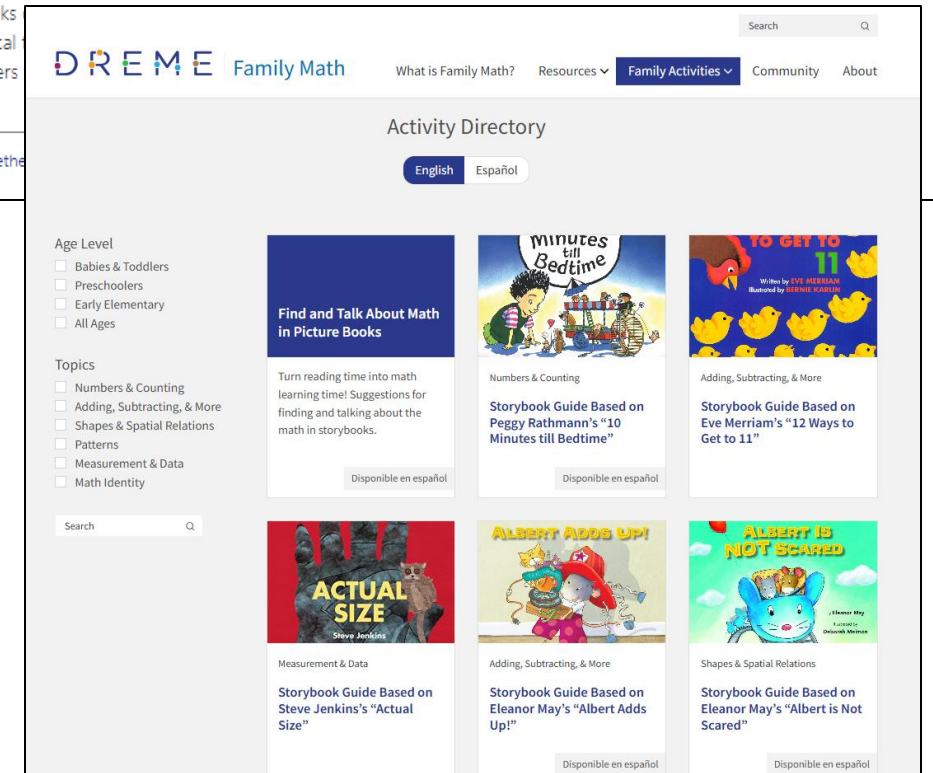
DREME Blog

## 40 Children's Books That Foster a Love of Math

by Colleen Uscianowski Maas & Herbert Ginsburg

Picture books mathematical math learners

Reading Together



DREME Family Math

What is Family Math? Resources ▾ Family Activities ▾ Community About

### Activity Directory

English Español

Age Level

- Babies & Toddlers
- Preschoolers
- Early Elementary
- All Ages

Topics

- Numbers & Counting
- Adding, Subtracting, & More
- Shapes & Spatial Relations
- Patterns
- Measurement & Data
- Math Identity

Search

Find and Talk About Math in Picture Books

Turn reading time into math learning time! Suggestions for finding and talking about the math in storybooks.

Disponibile en español

minutes till Bedtime

Numbers & Counting

Storybook Guide Based on Peggy Rathmann's "10 Minutes till Bedtime"

Disponibile en español

TO GET TO 11

Adding, Subtracting, & More

Storybook Guide Based on Eve Merriam's "12 Ways to Get to 11"

ACTUAL SIZE

Measurement & Data

Storybook Guide Based on Steve Jenkins's "Actual Size"

Albert Adds Up!

Adding, Subtracting, & More

Storybook Guide Based on Eleanor May's "Albert Adds Up!"

Disponibile en español

ALBERT IS NOT SCARED

Shapes & Spatial Relations

Storybook Guide Based on Eleanor May's "Albert is Not Scared"

Disponibile en español

<https://dreme.stanford.edu/news/40-childrens-books-that-foster-a-love-of-math/>

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## How to “mathematize” a book...

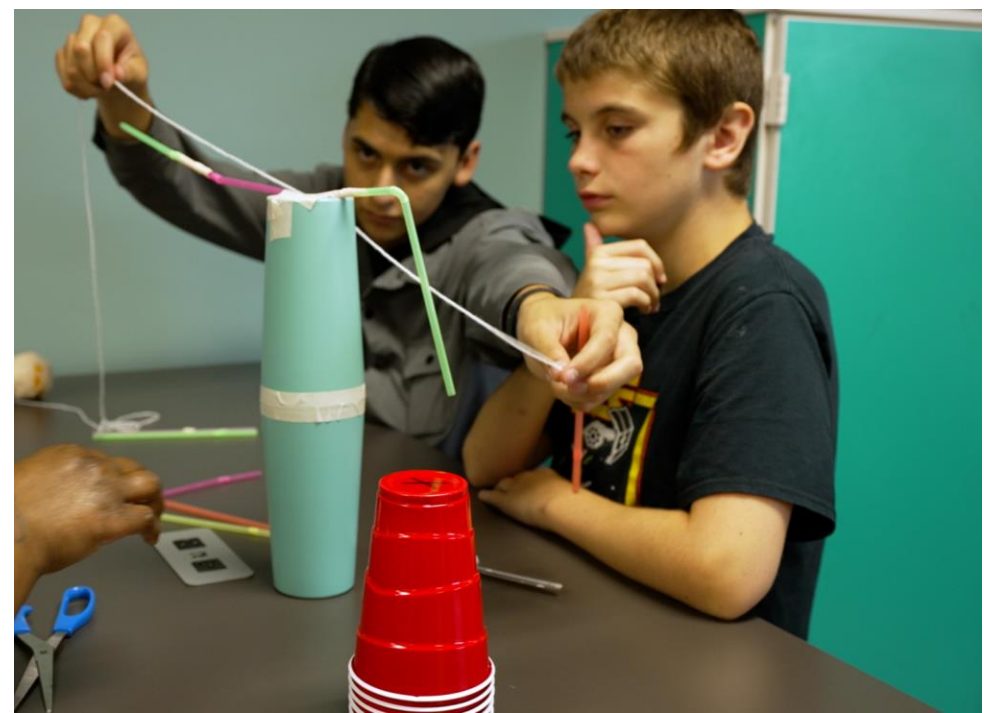
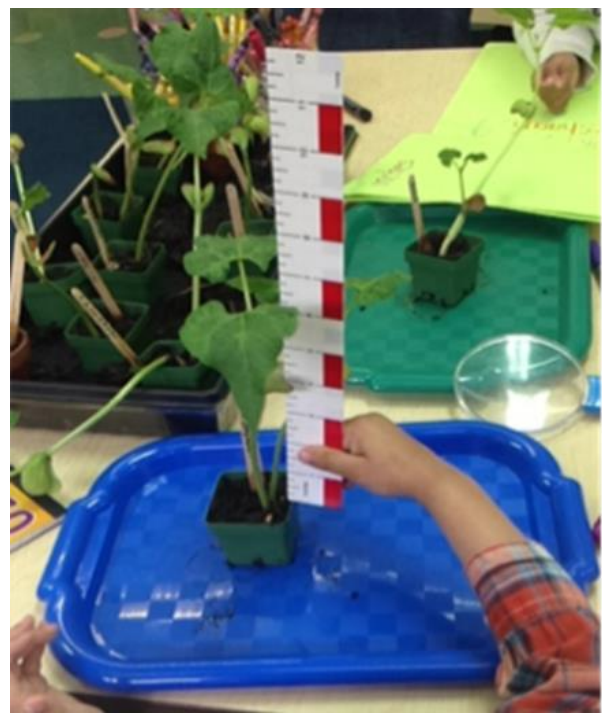
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- Read and identify math language
- Write questions on post its
- Introduce vocabulary
- Read the book several times throughout the week
- Ask questions
- Build connections between the book and classroom activities

DREME, 2026



# Hands on Exploration



# Environmental Design

*An effective learning environment encourages child-initiated exploration and intentionally introduces math-focused experiences through careful design and intentional selection of materials.*





## Math Moments

Making More of Math by  
Doing Math Throughout the  
Day

Early math is important for children's cognitive, social, emotional, and brain development. Math Moments are brief activities for incorporating math throughout the school day.

Learning math is like learning to use a special kind of lens that helps you see the world in different ways. Math language can help children talk about and communicate the math that they see. These activities are designed to help children practice using their math lens and math language to think about the world!

Mistakes are expected as your students build their math skills. To get the most out of any activity, try it multiple times, increasing the complexity and focusing on different math concepts. Each activity includes examples and possible modifications. These are meant to get you started. Adapt the activities based on your instructional goals or students' needs.

### Counting Cleanup

When putting toys away, ask children to pick up a certain number of toys and show you how many they picked up before putting them away.



Example: "Everyone find three toys to put away. I see that Jade has three books, 1-2-3. Riley, you found two blocks, 1-2. Find one more."

To add variety, ask children to perform a number action, like clapping two times, after they put the toys away.

Number, Counting, &  
Cardinality  
Clean Up

### Line Up by Number

Give each child a card with a numeral or set of dots on it. Have children get in line when their number is called. After everyone is lined up, have each child say their number.



Example: "Count to see how many dots are on your card. Remember the number of dots. When I call your number of dots, get in line."

To make it harder, have children work together to line up from smallest to biggest or biggest to smallest.

Number, Counting, &  
Cardinality  
Line Up

### Math Topics

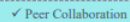


### Activities for all kinds of school-day moments!

- Clean up
- Line up
- Play
- Set up
- Meals
- Waiting
- Walking

### Peer Collaboration

Challenge children to work together when you see this peer collaboration box!



### Materials

Math Moments use materials typically found in classrooms, like blocks, or materials that can be easily created, like math cards.



Activities with this icon require simple materials or planning.

### Get Attention Using Number Actions

Use prompts about numbers to get children's attention.



Example: "If you can hear me, use your fingers to show me a number that's bigger than two."

To make it harder, use larger numbers or request two actions with different numbers. Example: "If you can hear me, clap three times and stomp your foot two times."

Number, Counting, &  
Cardinality  
Set Up

### Find the Number by Counting

Think of a number, then give children counting clues to guess the number.



Example: "I'm thinking of a number that comes right after four." Or: "I'm thinking of a number that comes right before seven."

To make it easier, use smaller numbers or a number line as a visual aid.

Number, Counting &  
Cardinality  
Waiting

# Embedding Math in Routines

Think about some of the daily routines you share with children and youth. What math language or concepts might you introduce into these everyday interactions?

# Responsive interactions in math are most effective when CYP professionals...



Elicit and attend to children and youths' mathematical thinking rather than focusing only on answers



Use questioning and feedback to scaffold understanding within the ZPD

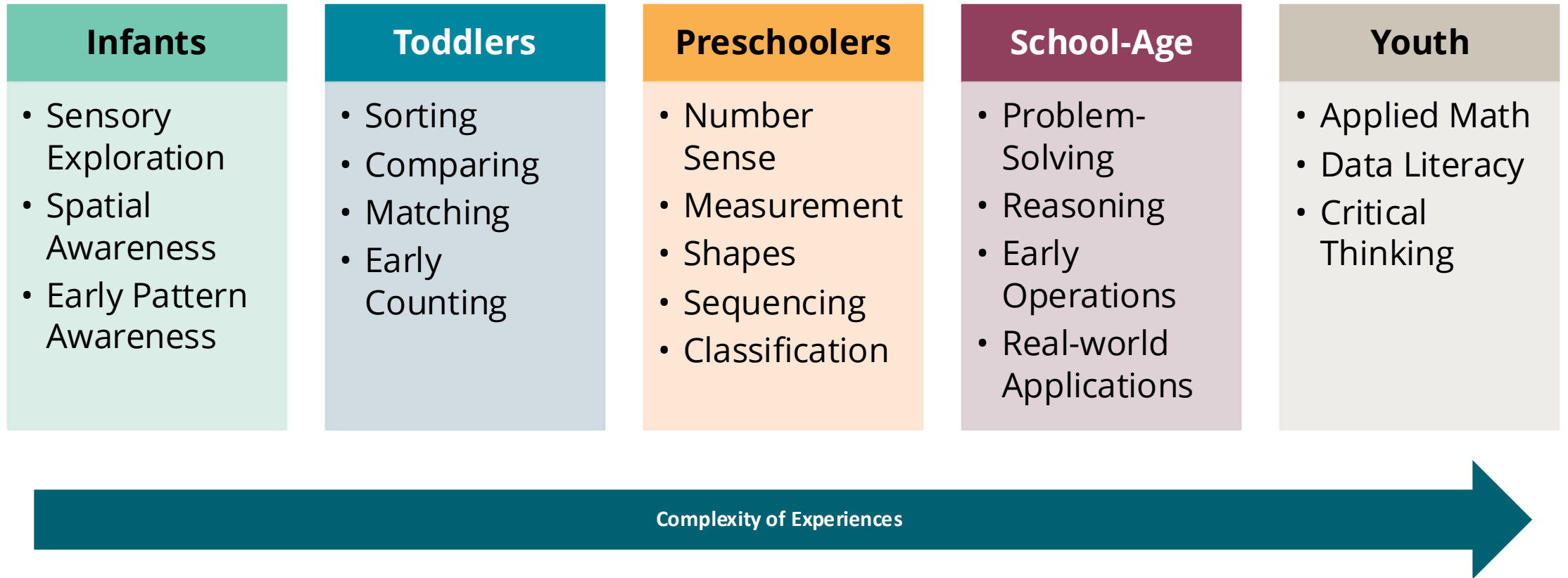


Encourage explanation, discussion, and justification of ideas



Integrate formative assessment as an interactive, ongoing process

# Developmental Math Experiences



# Infants & Toddlers

- Sets and Sorting
- Number Sense and Counting
- Number Operations
- Shapes
- Spatial Relationships
- Patterns
- Measurement

(O’Nan Brownell, Chen, & Ginet 2014)



## Selecting Materials



Whether you are purchasing new materials or deciding which materials to rotate into learning and play areas, you should be purposeful about how you make these decisions. Below are several points to consider when selecting materials:

1. Select materials that promote learning and are of interest to the infant or toddler. Materials should:

- Stimulate a response
- Encourage social interactions and play
- Engage more than one of the senses
- Be durable
- Promote open-ended discoveries

2. Include materials that support the development of infants and toddlers and are:

- Challenging but not frustrating
- Appealing to full range of developmental skills and interests

3. Provide duplicates (same color, size, function) of the same item to:

- Help reduce conflict
- Minimize the need for sharing; older toddlers can begin being introduced to turn-taking
- Support parallel play

4. Choose materials that honor infants' and toddlers' families. Materials should:

- Be representative of infants and toddlers in the program and their families
- E-S Be inclusive of infants and toddlers with varying abilities
- E-R Include infants and toddlers with varying abilities
- E-S Portray the diversity of the program and community (books, puzzles, photos, dolls, pretend food and cookware, posters, music props, and art supplies)
- E-R Portray the uniqueness of the program and community (books, puzzles, photos, dolls, pretend food and cookware, posters, music props, and art supplies)

5. Select items used in homes (e.g., kitchen spatulas, strainers, wooden spoons, plastic bowls) to:

- Provide open-ended play
- Help create a homelike environment
- Encourage families in learning new ways to use items from home to support development and learning

6. Offer materials that include a variety of:

- Textures: smooth, bumpy, squishy, rough, soft, woods, metals, plastics, fabrics
- Fine-motor skills: grasping, turning, poking, shaking, pushing, pulling, putting together, taking apart, using a pincer grasp
- Gross-motor skills: climbing, balancing, pulling, pushing, steering
- Colors
- Size
- Shapes
- Sounds
- Action: action-reaction(cause and effect) materials

7. Rotate materials when:

- Infants or toddlers appear to have lost interest
- They do not meet a child's developmental needs (too easy or too hard)
- They have been used for some time—rotate materials periodically unless children are still interested and actively using them

## Learning Materials for Cognitive Development



Identify how you can use each of the materials below to help promote the cognitive development of children in your care. Consider uses for infants and toddlers.

1. Peg Stackers



2. Colanders



3. School Bus and Accessories



4. Soft Materials of Different Textures



5. Metal Measuring Cups



6. Stacking Wood Blocks



7. Push/Pull Toys



8. Scarves



9. Shape Sorters



10. Small Boxes with Lids



11. Metal Bowls



12. Wood Pounding Blocks



IT, Learning Environments, Lesson 4

IT, Cognitive Development, Lesson 4

# Using the VLS to Promote Math with Infants & Toddlers

## Cognitive Competencies



Consider the different ways the infants and toddlers in your care engage in activities together. Use the information below to learn about various skills within the cognitive development domain and expectations of how infants and toddlers learn the given skills. Reflect on your previous experience and knowledge of child development to document examples of how each age group learns cognitive development skills through play. The Cause & Effect Skill has been completed as an example.

**Cognitive Skill:** Cause & Effect  
**Experience/Activity:** Building with Blocks

**Age range:** Birth to 8 months;  
**Learning Standard:** Use simple actions to make things happen.

**Expectations:** Explores blocks by mouthing, grasping, or hitting together.

**Age range:** 6 to 18 months;  
**Learning Standard:** Purposefully combine actions to make things happen.

**Expectations:** Waits for adult to stack blocks then knocks tower over and claps.

**Age range:** 16 to 36 months;  
**Learning Standard:** Demonstrate understanding that events have a cause; make predictions.

**Expectations:** Places larger block on the bottom and smaller blocks on top.

**Cognitive Skill:** Spatial Awareness  
**Experience/Activity:** Sand Play in the Sensory Table

**Age range:** Birth to 8 months;  
**Learning Standard:** Explore the properties of an object.

**Expectations:**

**Age range:** 6 to 18 months;  
**Learning Standard:** Explore how things fit and move in space.

**Expectations:**

**Age range:** 16 to 36 months;  
**Learning Standard:** Demonstrate how things fit together or move in space with increasing accuracy.

**Expectations:**

**Cognitive Skill:** Reasoning & Problem Solving  
**Experience/Activity:** Climbing on Mats

**Age range:** Birth to 8 months;  
**Learning Standard:** Actively use the body to find out about the world.

**Expectations:**

**Age range:** 6 to 18 months;  
**Learning Standard:** Use simple strategies to solve problems with support from a caregiver.

**Expectations:**

**Age range:** 16 to 36 months;  
**Learning Standard:** Solve problems without having to try every possibility while avoiding solutions that clearly will not work.

**Expectations:**

**Cognitive Skill:** Social Identity  
**Experience/Activity:** Dramatic Play with Dolls

**Age range:** Birth to 8 months;  
**Learning Standard:** Show awareness of self and awareness of other people.

**Expectations:**

**Age range:** 6 to 18 months;  
**Learning Standard:** Prefer familiar adults and recognize familiar actions and routines.

**Expectations:**

**Age range:** 16 to 36 months;  
**Learning Standard:** Identify self and others as belonging to one or more groups by observable characteristics.

**Expectations:**

**Cognitive Skill:** Memory  
**Experience/Activity:** Nature Walk

**Age range:** Birth to 8 months;  
**Learning Standard:** Exhibit different responses to familiar and unfamiliar people, places, and things.

**Expectations:**

**Age range:** 6 to 18 months;  
**Learning Standard:** Recall information over a period of time with contextual clues.

**Expectations:**

**Age range:** 16 to 36 months;  
**Learning Standard:** Recall information over a longer period of time without contextual clues.

**Expectations:**

**Cognitive Skill:** Group and Categorize  
**Experience/Activity:** Manipulating Farm Animal Figurines

**Age range:** Birth to 8 months;  
**Learning Standard:** Notice difference between familiar and unfamiliar people, places, and things.

**Expectations:**

**Age range:** 6 to 18 months;  
**Learning Standard:** Match two objects that are the same and select similar objects from a group.

**Expectations:**

**Age range:** 16 to 36 months;  
**Learning Standard:** Sort objects into two or more groups by their properties and uses.

**Expectations:**

IT, Cognitive Development, Lesson 5

# Preschool

- Number Sense
- Measurement
- Shapes
- Sequencing
- Classification

(NAEYC & NCTM, 2010)



## Child's Play: Toys and Games for Learning Goals



Name \_\_\_\_\_  
Certifier \_\_\_\_\_  
Date \_\_\_\_\_

All toys are not created equally. Some toys help children learn valuable social skills and promote learning goals in your classroom. This list can help you decide the best types of toys to purchase or create for your classroom.

### Toys that Encourage Cooperation

- Simple cooperative board games:
  - "Max: A Cooperative Game" (Family Pastimes)
  - "The Secret Door" (Family Pastimes)
  - "Hoot Owl Hoot!" (Peaceable Kingdom)
  - "Count Your Chickens" (Peaceable Kingdom)
- Simple cooperative movement games:
  - Cooperative musical chairs: Play like traditional musical chairs, except each child must find a place to sit when the music stops. Encourage children to share seats, sit on laps, and get creative about helping their friends find a place to sit. When the music stops, remove a chair and help children think of ways to sit.
  - Wagon pull: Encourage children to take turns pulling each other in a wagon.
  - Parachute games: Use small or large parachutes and encourage children to work together to keep a ball bouncing in the middle.
- Classroom toys:
  - Dominoes
  - Blocks
  - Balance rocker weights
  - Ramps for toy cars

### Toys that Encourage Imagination

- Dress-up clothes
- Simple dolls

### Simple Toys that Encourage Literacy and Language

- Alphabet magnets, beads, stamps, blocks
- Puppets
- Writing materials (stationary, pens, pencils, stamps, envelopes)
- Flannel board materials for stories
- Recycled materials from home (phone books, cereal boxes, cook books, instruction manuals)
- Dry-erase boards

### Simple Toys that Encourage Math and Problem-Solving

- Geo-boards with rubber or cloth bands
- Tangram puzzles
- Dominoes
- Timers
- Scoops and measuring cups
- Empty boxes and tubes
- Measuring tapes and rulers
- Calendars
- Dice
- Collections of "stuff" for sorting (buttons, stickers, toy cars, seashells, leaves, food labels)

### Simple Toys that Encourage Science and Exploration

- Stethoscope
- Magnifying glass
- Mirrors
- Beakers, tubes, pitchers
- Light table
- Magnets
- Collections of items with different scents and textures
- Collection of natural items (leaves, tree branches, grass, seeds)

### Simple Toys that Encourage Social Studies

- Maps
- Blueprints
- Blocks
- Board games
- Play money and cash register
- Mirrors

## What Am I Learning?



Name \_\_\_\_\_  
Certifier \_\_\_\_\_  
Date \_\_\_\_\_

Print these cards, cut them apart, and hang them in your interest areas or learning centers. In the blank area provided, a child may want to draw, or you can add photos of your own classroom interest areas.

What am I Learning in... Blocks?  
**Social Development.** During block play, I share ideas with other children. I also ask for materials I need, and I make plans with peers about how to use the materials and space.

**Physical Development.** I'm learning to balance large and small objects on top of each other. I might even create a balance beam to walk across! I also use tools like pencils and paper to draw my structure.

**Cognitive Development.** I'm learning about cause and effect when my tower falls down. I am also making predictions, solving problems, and making comparisons. I might count. I might read and write. I also sort and classify objects by different characteristics like size, color, and texture.

**Language Development.** I'm learning to describe materials around me. I'm using more complex vocabulary to talk about my structures.

What am I Learning in... Dramatic Play?  
**Social Development.** I am negotiating with other children to decide what to play. We are organizing our play and talking about how to play. I am learning to solve problems and work out conflicts with other children. I'm learning to follow rules and clean up after myself.

**Physical Development.** I am practicing taking care of myself by getting dressed. I'm snapping buttons, tying laces, and helping others.

**Cognitive Development.** I am showing you how much I already know about my world! I can pretend I am at the doctor's office, the veterinary clinic, school, church, home, and the store. I am beginning to understand time and talk about it in my play. When I set the table, I am learning about numbers and math. When I make a grocery list, I am learning about writing and reading.

**Language Development.** I am asking and answering questions. I am talking about my ideas, and I am listening to others' ideas. I am using language I hear every day like, "Can I help you?" and "Next, please." I am beginning to understand what print is all about. I "read" menus and food boxes in my play.

## Math



Resources / Topics / Subject Areas / Math

### Playful Math Learning at School



Make Math Meaningful for Diverse Learners



Play Games, Learn Math! Explore Numbers and Counting with Dot Card and Finger Games



Now Read This! Books that Bring Math to Life

### How Children Learn and Understand Math



Playful Math Instruction in the Context of Standards and Accountability

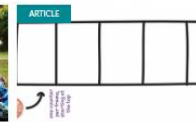


Mathematical Structure and Error in Kindergarten



Snapdragons and Math: Using Creativity to Inspire, Motivate, and Engage

### Math Ideas for Families





## School-Age & Youth

- **Make math active and engaging:** Use games, challenges, and hands-on activities to reinforce concepts in low-pressure, fun ways.
- **Connect math to real life:** Embed math into cooking, sports stats, budgeting, coding, art, and STEM projects youth already enjoy.
- **Emphasize problem-solving over practice:** Encourage exploration, collaboration, and multiple strategies rather than worksheets.
- **Build confidence and belonging:** Create supportive spaces where mistakes are part of learning and youth see themselves as “math thinkers.”
- **Extend school learning:** Coordinate with school goals while offering flexible, interesting opportunities to deepen understanding.

# Online Resources Worth Exploring

[Crazy 8s Club](#), from [After School Alliance's STEM Curriculum](#)

[SEDL Toolkits](#); [SEDL Math Projects](#)

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# Embedding Math into Program Practices

- ✓ Identify opportunities through observation
- ✓ Model math language and thinking
- ✓ Embed math into the environment (materials, labeling, routines)
- ✓ Consider math concepts when planning activities and experiences (“math lens”)



Children have a natural interest in math, and the *Teaching Math to Young Children* practice guide aims to help teachers capitalize on that interest to make children's preschool and school experience more engaging and beneficial.

**In this practice guide summary, you will find:**

- An overview of the guide's five practical, evidence-based recommendations
- Examples of innovative tools and strategies teachers can use in their classrooms
- A brief discussion of the evidence that supports the guide's recommendations

What Works Clearinghouse™

ies NATIONAL CENTER FOR  
EDUCATION EVALUATION  
AND REGIONAL ASSISTANCE  
Institute of Education Sciences

(Institute of Education Sciences, 2014)

Notice

Model

Leadership's  
Role

Coach

Support

# Additional VLS Supports

If you are interested in learning more about ways the Virtual Lab School supports professionals to promote math learning, we encourage you review these VLS courses more deeply:

Lessons & activities referenced in today's session:

- [Infant & Toddler, Learning Environments, Lesson 4: Learn](#)
- [Infant & Toddler, Cognitive Development, Lesson 4: Explore](#)
- [Infant & Toddler, Cognitive Development. Lesson 5: Explore](#)
- [Preschool, Learning Environment, Lesson 4: Explore](#)
- [Preschool, Cognitive Development, Lesson 5: Apply](#)

Additional courses for review:

- Learning Environments
- Cognitive Development
- Communication & Language Development, Lesson 4 (IT, PS, SA, FCC)
- Targeted Professional Development, Quality Observations: Leadership's Role

# References & Resources (1/2)

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