RESEARCH NOTES

SUPPORTING MATH SKILLS IN INFANTS AND TODDLERS

Math concepts are a natural part of our routines and activities throughout the day. This is true for children and adults. Math refers to numbers and counting, but it also includes knowledge of shapes, patterns, measurement, and spatial sense. Infants and toddlers naturally explore these math concepts as they play. Adults can highlight the math in children's everyday experiences by providing language and support.

THE TAKE HOME:

1. Infants and toddlers build early foundations for math during play and daily routines.
2. Math is integral to learning across developmental domains.
3. Effective practices for building math skills include creating responsive environments, using intentional language, encouraging family engagement, and incorporating math into everyday experiences.

WHAT DOES RESEARCH SAY?

- Math isn't just a subject to be taught once children start school. **Math skills begin developing early.** For example, infants pay attention to quantity during their interactions with people and the environment. They learn about quantity as they reach or look for more than one object. Supporting math skills in early childhood is related to later success in school. Children's math skills in preschool predict how well they will score in third grade reading and math.
- Infants and toddlers **need time and space to play in open-ended ways with varied materials** to boost their emerging math skills. This is a big part of what children do naturally during play. Adults can introduce math concepts like size and shape, and spatial words like *in*, *between*, and *under* during any type of play or routine. When working with children who are dual language learners (DLLs), adults should speak in short sentences and provide key math concepts in English and the child's home language, when possible.
- Children benefit from early spatial play. Research shows there is a relationship between how often young children play with puzzles and their later spatial skills. Infants and toddlers develop spatial skills by mouthing objects, turning toys in their hands and looking at them from different perspectives, and using materials like nesting cups or shape sorters. **Spatial skills can be improved with practice at any age.**
- **Math skills are connected to other learning domains**, such as language and social and emotional development. When infants and toddlers feel emotionally and physically safe, they are more confident to explore their world, which supports the development of math skills. This might be experimenting with how tall they can build a tower before it falls or climbing the steps to go down a slide. Responsive adults provide math language to describe the concepts children are exploring.
- **Families play an important role in teaching young children math skills** so they are ready for school. Research shows that children are more likely to have higher math scores when their parents include math activities at home. The best way to do this is to encourage families to explore math concepts with children during their regular daily activities and routines.

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WHAT DOES IT LOOK LIKE?

- All learning (including math!) happens in the context of relationships. Children need consistent, responsive caregivers to feel safe and supported. When they feel this way, they are more likely to explore and learn new skills. Responsive learning environments build on the diverse languages, cultures, experiences, and interests of each child. To support and be responsive to children who are DLLs, adults use visual cues and identify math concepts in English and their home language when possible.
- Math exploration and learning happen everywhere. Children learn math skills in their early learning setting, but also in places like the grocery store, playground, and in their home. Infants and toddlers learn about quantity as an adult counts two apples to put into their shopping cart. They develop early spatial skills as adults push them on the swings or as they go down a slide. At home, math can be found from playtime to mealtime. For example, a caregiver says as he prepares lunch, "Your sandwich is a square. If we cut it in half, it makes two rectangles."
- Young children naturally explore math concepts as they play, and adults support their math knowledge and vocabulary with the language they use. Adults intentionally use math talk during what they're already doing every day. They introduce spatial concepts like, "I'm going to pick you *up* and then put you *down* in your crib." Or they can compare the size of their shoes as they get ready to go outside, "Your sneakers are smaller than my sneakers." Adults can use math language during mealtimes, "How many blueberries do you have left? Do you need more?" The more math language children hear each day, the greater the growth of their math knowledge.
- Infants and toddlers need time and space to play in open-ended ways with varied materials to boost emergent math skills. Special math materials or tools are not necessary. Materials can be anything from cups or containers to socks from the laundry. Infants and toddlers learn about measurement as they fill and dump water, sand, or dirt. They can use those same cups to learn about size and how things fit together as they try to nest or stack them. Adults can use everyday materials with children with identified disabilities or suspected delays by choosing materials that are easy to grasp and manipulate and by offering support for children's play, such as holding the large cups steady as they stack.
- Support families in thinking of ways important cultural skills or traditions include math concepts. They may explore patterns as they clap and dance to music together. They explore numbers and measurement while making the family's favorite dish.
- Daily routines are full of opportunities for developing math skills. A predictable schedule and routine help infants and toddlers learn about the concept of time. For example, naptime always happens after a bottle and books. Going through routines also teaches children about *patterns*: We always wash our hands before we eat.

TRY THIS!

- Encourage exploration of different, safe environments and materials. Infants and toddlers develop a sense of numbers and are introduced to shape and size as they explore different non-chokeable objects with their hands or mouth.
- Head outside. Talk about math concepts as you look for patterns on the buildings, collect rocks to sort and stack, or see who can run "the fastest!"
- Stick to a routine. When you follow the same routine before nap or meal time, children not only feel more secure, but they learn about patterns and measurement concepts, like time.

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- Listen and move to music together. It helps infants and toddlers develop a sense of their body in space that encourages spatial awareness. Sing songs with hand movements like "Open, Shut Them" and "Pat-a-cake." Songs with repeating words or actions build skills in recognizing patterns.
- Help families "find the math" in the things they already do every day. Toddlers can practice sorting toys into bins during clean up time or discover spatial concepts as they climb up stairs or through blanket forts or tunnels.
- Create and look for patterns. Clap and stomp to music. Find patterns in your clothing or around the house like stripes on a rug. Line up a red block, then a blue, then red, and another blue. Ask what color comes next.
- Make time for math talk. Language is what brings math concepts to life for children. When you raise an infant up and down off your lap, they experience their body moving in space. But you mathematize the action and teach spatial concepts by saying "up" and "down" as you move them.
- Play with blocks. Blocks are a great way to encourage open-ended play. Infants can explore shape and size with their hands and mouth. Use shape words to describe the blocks like, "That block is a cube. Each side is a square." Toddlers practice spatial concepts like "on" and "under" as they stack then eventually build.
- Put together puzzles. Children practice spatial skills as they rotate and turn each piece to find its place.

LEARN MORE

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: Emergent Mathematical Thinking
https://eclkc.ohs.acf.hhs.gov/school-readiness/effective-practice-guides/emergent-mathematical-thinking

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You can find math in just about everything you do. Think of the home as a learning environment that supports math learning. All you need is what is already in the environment. Discover objects and toys together to use for math related play. You can make children's play and routines mathematical through the language and support you provide while at home, around the neighborhood or your community.

READ A BOOK

Books don't need to be about math. You can add math concepts to any book! Compare and contrast, describe the shape and size of objects, talk about numbers or spatial concepts like *between* and *behind*. Give toddlers space to fill in the word in a line that repeats itself to highlight patterns, like "Brown bear, brown bear, what do you (*see*)." Find a favorite book and think of how you can add math.

FILL AND DUMP

Find different size measuring cups, plastic containers, or spoons around the house. Let children fill and dump water in the kitchen sink, bathroom tub, or a bucket outside. What other materials can young children use to explore measurement? Invite toddlers to help measure ingredients the next time you make dinner.

PLAY *I SPY* SHAPES

Pick a shape and look for it in the house, outside, or on an errand. Say, "I spy something round. What do you see?" Use spatial language to offer clues, like "it's *above* the bookshelf." Talk about the name and properties of the shape, such as, "The square has four sides and four points." Older toddlers can spy objects too!

MAKE IT ROUTINE

Routines teach children about patterns, but they can include other math concepts too! Snuggle up for a book and a bottle every day before nap. Don't forget to introduce math concepts as you read. Turn your clean-up routine into a fun sorting task. "The blocks go in this bin and the puzzles go on the shelf." Time your toddler to see how fast they can clean up!

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