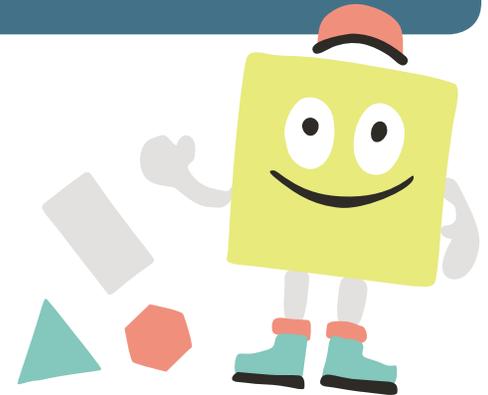


# LET'S TALK, READ AND SING ABOUT STEM!

## TIPS FOR INFANT/TODDLER TEACHERS & PROVIDERS

From birth children are inquisitive. You can nurture early **science, technology, engineering and math (STEM)** concepts and skills through daily routines and play and exploration activities that you provide for the babies and children in your program. By talking, reading, singing, playing, signing, or using other ways to communicate – whatever works best for your infants and toddlers – you can help them purposefully develop STEM skills. For example, count a baby's toes, describe the changing leaves with children, or talk with a toddler as you play with blocks together!



Research shows that having a strong foundation in early math, for example, can lead to higher achievement in both math AND reading later in school.<sup>1</sup> In addition, interacting with many different materials in early childhood prepares students for science and engineering later in school. Use the **bolded STEM words** in these tips to communicate about **early STEM concepts** with young children every day. It's never too early to start!

Partner with families and encourage them to try these strategies at home, in their home language. Early exposure to home language instruction is critical for fostering a rich sense of self, and research has shown that students who are bilingual have certain cognitive and social benefits that facilitate success in school and life.<sup>2</sup>

For children with disabilities or developmental delays, communicate with their other service providers and keep each other informed about the strategies you are using to enhance their language environment.

While we provide some tips, we know every child is unique. As always, you should do what is best and most developmentally appropriate for each child.

### WHAT IS STEM?

“STEM” stands for **science, technology, engineering and math**. STEM can refer to the subjects individually or one or more working together, but can also mean a way of doing things that includes solving problems, asking questions, and exploring the world around us.

For example, children learn about the concept of technology when they're exploring tools or simple machines and investigating how they work. These can be items they use every day like a pair of scissors, or things they might see like the wheels of a car as they walk outside.

For young children, we focus on STEM through exploration, play, and building curiosity about the natural world and the way things work. STEM learning is important for everyone and can happen anytime, anywhere. The real-life skills that people develop when learning STEM help make everyone better problem-solvers and learners.

For children who are learning English as an additional language, talk about **STEM** in the children's **home language**, in English, or both. Research shows that bilingual children have greater mental flexibility, which may be helpful in understanding math concepts.

*Source: Zelasko, N., & Antunez, B. (2000). If your child learns in two languages. National Clearinghouse for Bilingual Education.*

## LET'S TALK STEM TIPS

- **Let's discover the world!** Observing is important in science. Talk throughout the day about what you see and what children are looking at: "Wow, I love that **big** red truck you are playing with! How many wheels does it have? **1, 2, 3, 4** wheels. Four wheels **all together**."
- **Use STEM language in everyday routines.** During snack time, encourage children to lift the **heavy** apple and the **light** napkin. Show children a **whole** sandwich being cut into **half**.
- **Ask open-ended questions.** These are questions that encourage children to respond with more than a "yes" or "no" answer. Ask children to describe objects and toys around them. Encourage them to compare the **size, shape, color, texture, smell** and **weight** of different objects.
- **Use books.** During reading time, use STEM language, too. **Count** objects on a page out loud for infants, or ask toddlers if they can find a **square** or a **triangle**.
- **Follow the child's lead.** Focus on your child's interests to create STEM learning opportunities. Observe children closely and see what they are pointing to, looking at or seem curious about. If the child is excited about playing with dolls, **count** the doll's arms and legs, talk about the **shape** of the doll's eyes, and compare the **size** of the doll to other toys. Is she **bigger** or **smaller**? **Taller** or **shorter**?
- **Make discoveries together!** Go outside and explore new objects. Talk about them and **compare** them. How many different types of leaves can you find? Can you find a **small, medium, and large** rock? Can you find a **square** object and a **circular** object?
- **Sing about STEM!** Songs with **repetitive patterns** like "Old MacDonald Had a Farm," "Wheels on the Bus," or "Los Cinco Hermanitos" can teach children about patterns.
- **Make it fun!** Children are naturally curious. Children learn best through play. Teach children **spatial awareness** skills by playing simple games like peek-a-boo. Teach them about the position of their own bodies in relation to others (e.g., next to, in front of, above, behind, etc.).

## STEM CONCEPTS & ACTIVITIES

### MEASUREMENT

Children develop **measurement** skills as they explore the **size, length, height, and weight** of people or objects—like when they describe a baby sibling as **little** and themselves as **big**.

- Babies learn about distance when they need to adjust their own movements to grab something they're interested in. Place infants' toys **nearby** and others a bit **farther away**, but still within reach. Put words to their actions: "You are reaching so **far** to get the ball!" Or, "That one is very **near**—can you get it?"
- Toddlers can start comparing objects by size. Teach them about large and small. Ask them to sort a set of objects from **smallest** to **largest**. Help children learn by asking questions like "Who is **taller**?" and "Which ball is **heavier**?"
- At the park, you can explore and measure everyday objects together. Use a stick or a leaf to see how **long** or **tall** the slide is. Is it **three or four sticks long**? Build skills to create future **scientists** by exploring and measuring things together!

## COUNTING, ADDITION & SUBTRACTION

When you **count** with children and point out how amounts change when you **add** or **remove** objects, you help lay the foundation for **addition** and **subtraction** (and, much later, multiplication and division).

- Teach infants about the concept of “**more**” –the first step toward understanding addition. As you feed a baby, pause and ask if she wants **more**. Wait to see how she responds to your questions and read her cues.
- Use numbers with infants as you go about your day together. **Count** the steps as you walk up or down them, or a baby’s fingers or toes while you play.
- Sing simple number songs like “**One, two**, buckle your shoe” and “Tres Pececitos.”
- Play “silly stacks” with toddlers. Count as the toddler stacks blocks. Stack two blocks or objects and then ask the toddler, “Do you want **one more**?” Keep offering **one more** for the child to add to the stack. Building together can inspire future engineers!
- At the playground, ask toddlers to count **how many** big-kid swings you see, and how many little-kid swings. Then count the two groups of swings **all together**.

## SPATIAL RELATIONS

Children develop **spatial relations** skills as they explore and learn to compare shapes and sizes of objects, space and position like **on top of** and **under**, and direction and movement—following and predicting the path of a moving object, like a rolling ball. These simple activities can build the foundation for later math and engineering skills.

- When you move infants from one position or place to another, put words to your actions. Say “**up, up, up**” when you lift baby from the changing table, crib, or floor. When you place her down, say “now **down, down, down** you go to play!”

- Make an obstacle course with pillows for babies to climb over and to sit on. As the baby explores the course, describe their position in words: “Now you’re sitting **on top of** the cushion! Now you’re crawling **over** it. You went **around** it!”
- Give toddlers a large cardboard box to climb **inside** and **outside** of. Describe their position as they play. Provide empty boxes or kitchen containers of various sizes for children to stack or place **inside of**, **next to**, or **behind** the larger box or each other.

## SHAPES

Teach your child the names of shapes and what makes them different. Understanding **shapes** is one of the early math and science concepts that children develop, like knowing that a **triangle** has **three straight sides** and **three angles**.

- Encourage babies to explore the shapes of objects using their sense of touch. With an infant, hold an orange in your hand and say, “An orange is **round** and **smooth**.” Hold a dish towel and say, “This towel is a **rectangle** and feels **soft**.” Ask questions that encourage observation and description, like “Which fruit is red? Can you find the yellow fruit?”
- Explore shapes by rolling a ball back and forth, stacking **flat** objects on top of one another, or putting small objects inside a box or bucket. Use words to describe the activity such as, “The ball is **round** and **rolls**,” “The newspapers are **flat** and make a neat stack.”
- Have a shape snack with toddlers. Offer a **square** (or **rectangle**) cracker. Cut a grape in **half** to show children its **round** shape. Cut a piece of cheese into a **triangle**. Talk about and trace each shape with your finger before you eat it. Ask children, “Would you like your sandwich cut in **four triangles** or **four squares**?”
- Point to shapes in the world around you. A stop sign is a red **octagon with eight sides**. The clock in a classroom is a **round circle**.

## PATTERNS

Thinking about **patterns** helps children make sense of math and science; it helps them predict what will happen. A pattern is as easy as something that repeats more than once—like red, blue, red, blue, red, blue. Or it's light during the day and dark at night.

- Routines help babies feel safe and secure, and also build an early understanding of patterns. A **daily routine** is a pattern for infants. You might say: "It's time for a nap. Let's do our routine – diaper, milk and a story."
- Share songs that have **repetitive** patterns, like "Old MacDonald Had a Farm" and "Wheels on the Bus." Try rhymes with hand movement patterns like "Itsy-Bitsy Spider."
- Help children make a **pattern** with crayons. Place one pointing up, the next pointing **down**, etc. As you make the pattern, ask, "**What comes next?**"

## EARTH, PHYSICAL, AND LIFE SCIENCE

Children are natural scientists, and it's never too early to start learning basic science skills like **observation** and **prediction**.

- Encourage toddlers to use **all their senses** as they observe and explore the natural world. Take a nature walk. Ask **open-ended questions** as they explore nature like, "What does it **look** like? **Feel** like? **Smell** like? **Sound** like?" Or, "I **wonder** what those ants are doing? Let's take a closer look."
- Conduct fun **investigations** together. Mix different colors of paint together to see what new colors you can create. "I wonder what color we will make." You could also provide a large container of water and a variety of objects, and make predictions aloud on whether each item will **float** or **sink**.

## ENGINEERING SKILLS AND CONCEPTS

Children can explore early engineering skills through building models, trying out new ideas, and designing structures.

- Encourage children to describe structures they see outdoors (e.g., bridges, buildings, towers). To support children's engineering skills, talk together about the buildings and other structures in your neighborhood. Encourage children to describe how they look (**tall, short, pointy, wide, etc.**) or what kinds of **materials, tools, or machines** they were built with.
- Create a **ramp** with a cardboard box or wooden board. Place objects with different **shapes** and **materials** at the top to find out what they do on the ramp. Some might **roll**. Some might **slide**. Some might not move at all! Talk about the attributes of objects that roll and those that slide.

## TECHNOLOGY

Explore **technology** with children by observing and using simple **tools** and **machines** you find around you.

- Encourage children to explore toys that have wheels and those that do not. Take the **wheels** off a toy car or find a broken one so children can explore and compare function.
- Let children explore tools like spoons, forks, popsicle sticks, and plastic shovels and rakes. Have children use the "wrong" tool for the job (e.g., a fork to eat soup or a rake to dig). This helps even young children focus on the function of the "best" tool and about other ways to solve the problem.



You can find more tips like these—as well as videos, information, and more—at [Too Small to Fail](#) and [Let's Talk about Math](#). Other early childhood STEM resources can be found at the [Early Childhood Learning & Knowledge Center](#). Track the development of the children in your program and encourage families to do the same by using the [Milestones Moments Booklet](#). If you have concerns about a child's development, including their language development, talk to the child's family about it. Ask them if they have concerns and if they observe the same issues at home. With their permission, conduct a developmental and behavioral screening and encourage them to talk to their primary care provider.

For more information on developmental and behavioral screening, visit [Birth to Five: Watch Me Thrive!](#) and [Learn the Signs. Act Early](#). For more information on early learning, please visit the [National Center on Early Childhood Development, Teaching, and Learning \(NCECDTL\)](#), [Head Start's Center on Quality Teaching and Learning](#), [Early Head Start National Resource Center](#) and the U.S. Department of Education [early learning webpage](#).

For more information on working with young children who are learning more than one language, please visit [Head Start's National Center for Cultural and Linguistic Responsiveness](#) and the [National Clearinghouse for English Language Acquisition \(NCELA\)](#). For more information on making the language environment richer for children with developmental disabilities or delays, please visit the [Center for Early Literacy Learning](#), and [Facts about Developmental Disabilities](#). For resources on building language, see the [Talk, Read, and Sing Together Every Day!](#) tip sheets.

These resource materials are provided for the user's convenience. The inclusion of these materials is not intended to reflect its importance, nor is it intended to endorse any views expressed, or products or services offered. These materials may contain the views and recommendations of various subject matter experts as well as hypertext links, contact addresses and websites to information created and maintained by other public and private organizations. The opinions expressed in any of these materials do not necessarily reflect the positions or policies of the U.S. Departments of Education and Health and Human Services. The U.S. Departments of Education and Health and Human Services do not control or guarantee the accuracy, relevance, timeliness, or completeness of any outside information included in these materials.

## NOTES

1. K. Denton and J. West, "Children's Reading and Mathematics Achievement in Kindergarten and First Grade (Washington, DC: U.S. Government Printing Office, 2002). A. Claessens and others, "Kindergarten skills and fifth-grade achievement: Evidence from the ECLS-K," *Economics of Education Review* 28(4) (2009): 415–427. G. Duncan and others, "School readiness and later achievement," *Developmental Psychology* 43(6) (2007): 1428–46.
2. Diaz, R. (1985). The intellectual power of bilingualism. In Southwest Hispanic Research Institute, *Second language learning by young children*. Albuquerque, NM: University of New Mexico. Zelasko, N., & Antunez, B. (2000). If your child learns in two languages. National Clearinghouse for Bilingual Education. Retrieved from [http://www.ncela.gwu.edu/files/uploads/9/IfYourChildLearnsInTwoLangs\\_English.pdf](http://www.ncela.gwu.edu/files/uploads/9/IfYourChildLearnsInTwoLangs_English.pdf)

