

STEM FOR EVERYONE!

INSTITUTE FOR LEARNING & BRAIN SCIENCES



Science, Technology, Engineering, and Math or STEM are skills that you (yes you!) use every day. But is STEM just for school or certain jobs? No! STEM is all about being curious, exploring, and describing the world around us, and solving problems.

Science begins with a sense of wonder and curiosity. It is all about asking "why?", "how?", "I wonder?", and "what if?" We use science skills anytime we are observing, exploring, making predictions, and discovering new things.

Technology is about using and creating tools. Tools range in complexity from a hammer to a robot. Exploring a new tool, from a rolling pin to a flashlight, can help build children's confidence, creativity, and problem-solving skills.

Engineering involves designing and building structures and products. It is about identifying and defining a problem and working to find a solution. When children build with blocks they are engineering!

Math is counting and numbers, but it is also sorting, measuring, making comparisons and more. We all use math when we compare grocery prices, describe where something is, or notice patterns and rhythms in our lives.

STEM STEREOTYPES

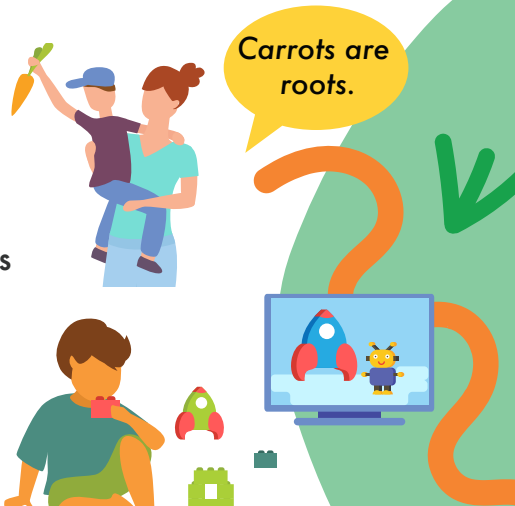


Who comes to mind when you think of a mathematician? An Engineer? Even though we all use STEM skills every day, limiting ideas about who STEM is “for” are everywhere.

These stereotypes begin early. By first grade, children already think that girls are less interested in STEM than boys. By third grade, children are more likely to say that “math is for boys.” Identifying with math (“I’m a math person”) is important: children who do, score better on math tests regardless of ability. From infancy, children’s experiences shape and form these beliefs. Here are three key reasons why:

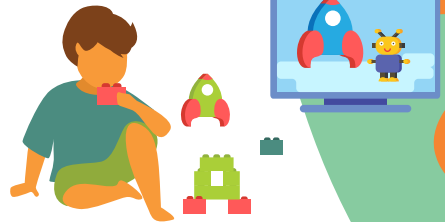
LANGUAGE

Words can signal who does STEM. For example, saying “Girls are just as smart as boys” implies girls are not really as good. Adults also give boys more explanations about STEM subjects.



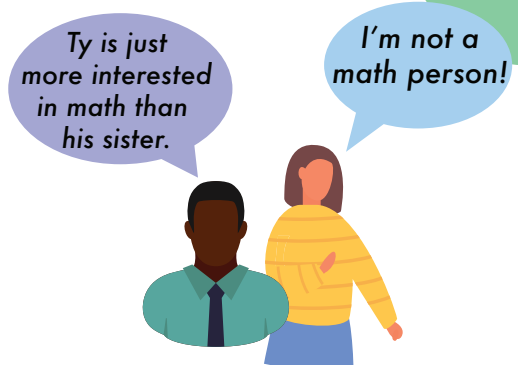
MARKETING & ACCESS

STEM toys are three times more likely to be marketed to boys. From a young age, boys have more access to STEM toys and activities.



BELIEFS & ATTITUDES

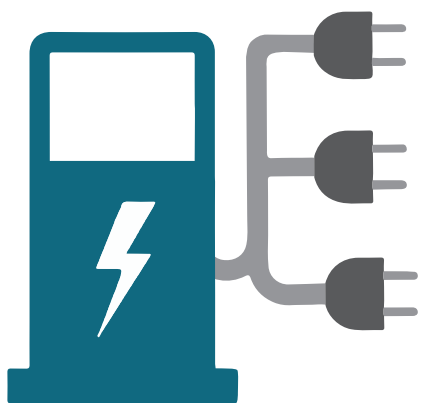
Parents often think STEM is harder and less interesting for girls than boys. Teachers’ attitudes (positive or negative) predict students’ later success in STEM.



STEM IS FOR EVERYONE

Even though children start forming stereotypes about STEM early, these ideas are still very flexible. As adults, we can help children build positive STEM identities.

One of the most important things we can do is provide children with early access to fun STEM experiences. Research shows that children who have positive early STEM experiences are more motivated and more confident in their STEM abilities.



STEM learning opportunities are like accessing a charging station.

Each STEM experience allows children to charge up their skills and motivation in STEM.

Some children have access to many opportunities, while other children have fewer chances to charge their STEM skills.

Diverse voices, perspectives, ideas, and skills in STEM fields are critical. The creative solutions to our biggest challenges will come from our unique experiences and community knowledge.



Use this book as a guide, and a mini charging station. It is full of fun activities and tips for bringing more STEM into your everyday life.

BUILD POSITIVE STEM IDENTITIES



Make It Social. Children are more motivated and engaged when they feel like they are part of a group.



Keep It Flexible. Children don't need expensive toys or kits to build STEM skills. Providing open-ended materials, like cardboard boxes, helps children's creativity and engineering skills shine!



Make Time to Explore. Kids are curious about everything. Preschoolers ask an average of 107 questions per hour! You don't need to have all the answers. Wonder out loud, or investigate an idea together. Follow your child's curiosity, even if it is not exactly what you planned for the day!



Connect with Role Models. Children are more likely to be interested in STEM when they see themselves represented in STEM activities and careers. Connect children to role models through books, movies, and community events.



Model Persistence. Building tolerance for frustration and problem solving is a key STEM skill. The best way to help children learn persistence is to model it yourself!



Use Math Language. Research shows children whose parents use more math language, also use more math language themselves and perform better on math tests. Math language can be as simple as "here, there, below, above, more, less" etc. All these words help young children build early math skills.



Play Along. As you play with your child, follow their lead, but provide prompts or ask questions that extend their exploration and inquiry skills.

SENSORY HUNT

Babies are natural scientists: observing, exploring and wondering about their world, even running little tests. Build on this natural curiosity and wonder by exploring together.

A trip outside is the perfect place to explore new sensations.

- What sounds do you hear?
- Are there plants you can smell and touch? What about wood, rocks, water, or cement?
- What is the weather like today - is it cold or warm? Wet or dry?

As you are exploring, describe what you are seeing, hearing, smelling, or feeling. This will help children build their vocabularies and understanding of the world. The ability to notice and describe different features is a key STEM skill.



To explore together inside, gather different types of materials and lay them out on the floor. Allow your baby to crawl, roll, and scoot around to the different textures and materials. Extend the fun by hiding objects underneath the materials and inviting your baby to discover and explore these hidden treasures!

If your baby isn't mobile yet, try hanging different materials in front of them or hand them different objects to explore - usually with their mouths!



DANCE, BABY

Love music? Try dancing with your baby. Research shows that listening and moving to music can help babies learn to recognize patterns and rhythms - an important STEM and language development skill.

The first months (and years!) of parenting can be a blur. The best thing you can do for you and your baby is to spend time together that you both enjoy.

The type of music doesn't matter - truly. No one type of music is "better" for your child's brain. In fact, listening to lots of different types of music will help your child learn different rhythms and patterns. So choose something that YOU enjoy listening and moving to.

Pick music to match your mood. Feeling energized? Try something with a good beat. Feeling tired and want to wind down? Pick something soothing and slow. Sitting and rocking your baby to a song you enjoy can be wonderful for you both.

As you dance, you can bounce, rock, or move your baby to the beat. Try different tempos and rhythms, exploring all the ways you and your baby can enjoy music and movement together.



BLANKET FORT

Building a fort together is a great way to practice engineering skills. As you make the structure, children will strengthen their spatial awareness and problem solving skills.

Extend the Fun:

Add in some challenges. How tall can you make the fort? Can you make a tunnel? Building forts can be challenging - modeling resilience and working through challenges is a great foundation for STEM learning.

Collect a few chairs and blankets in a room. Follow your child's lead to build a fort together using items you gathered. Explore what blankets work the best, troubleshoot how to make blankets stay in place. If you don't have a lot of space to build, throwing a blanket over a table can offer a simple solution.

Try building a fort using other materials like cardboard, newspapers, or clothing. When the weather is nice, build some epic forts outside too!



SHADOW PLAY

Explore cause and effect, spatial reasoning, relative size, and geometric shapes as you make shadows dance on the wall.

Gather items that could make interesting shadows or light effects like paper, foil, a colander, (old) glasses, shiny bowls, etc. Then turn the lights off in a room and set up a single light so it shines towards a wall - a phone flashlight will work!

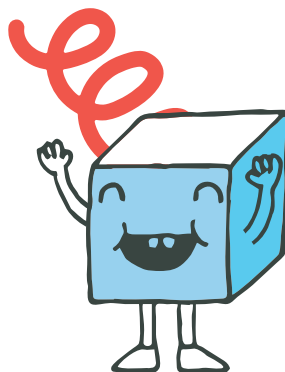
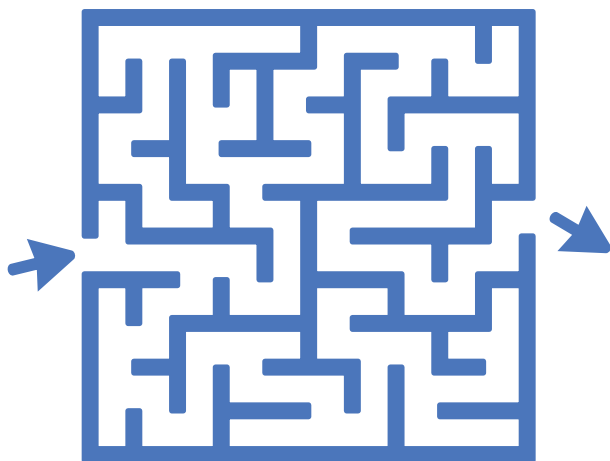
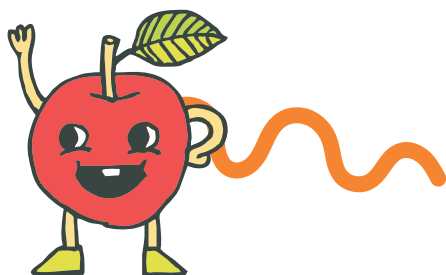
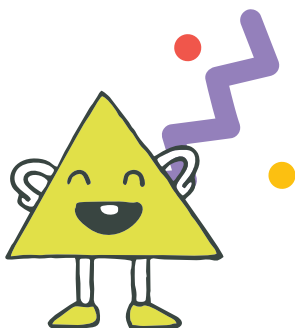
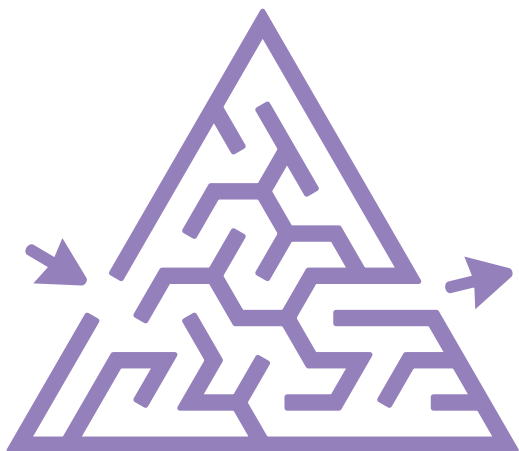
Encourage your child to hold items in front of the light and experiment with creating different types of shadows.

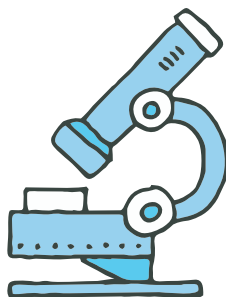
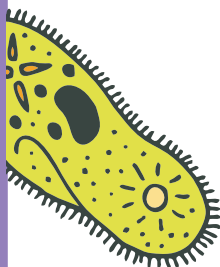
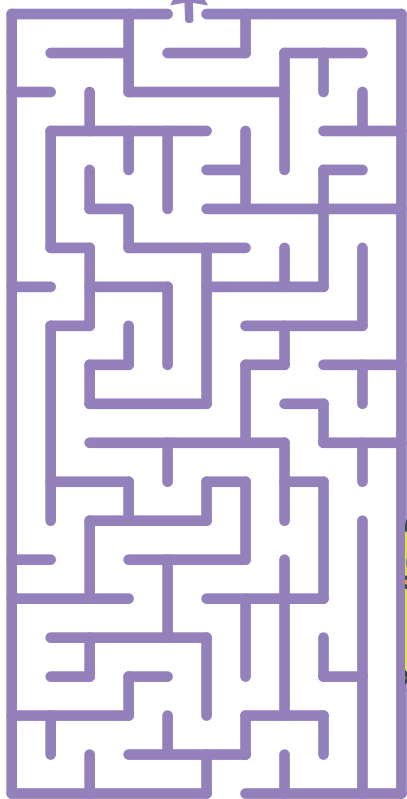
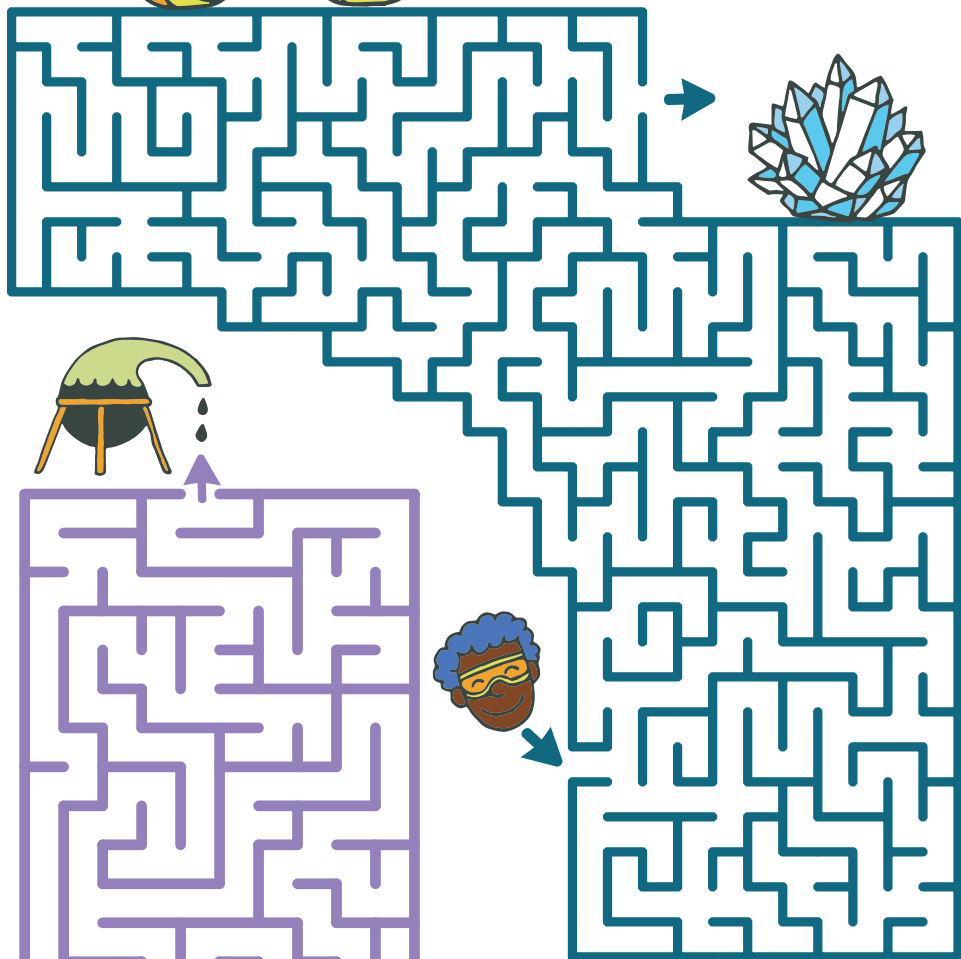
Exploring the features of different materials and their relation to light and shadow is a fun way to investigate STEM concepts. Support your child in their discovery by asking questions or posing an experiment: "Which object will create a reflection? What shape do you think the shadow will be?"

After they have time to play and explore, create a guessing game with the objects. Ask them to guess the object from its shadow. And remember, taking turns and talking together supports STEM learning!



YOU'RE A-MAZE-ING!





CODING MOVEMENT



Creating and following patterns is a fun math and engineering skill to practice. Use this game to boost turn taking, physical movement, and pattern recognition skills.

Cut out the action squares on the previous page. Go through the set and try each one together. Then ask your child to create a sequence with a few of the action cards. Go through the pattern together, following the movements.

Take turns doing the pattern. Change the pattern by one card, or add a new card to the sequence. Try doubling one action (2x), or repeating or reversing the pattern. Can you do the pattern without looking? Try making a 'mistake' by acting out the wrong pattern and see if your child notices!

Adjust the Challenge

- If the amount of action cards is overwhelming, try reducing the number of cards, then increasing them as they get better at remembering patterns.
- If the card actions are too advanced for your child, you can create your own cards with movements your child is comfortable with.
- To increase the challenge, have your child create action cards of their own!





CLAP



SPIN



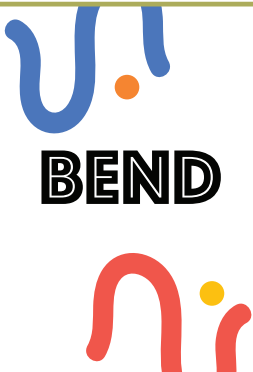
WIGGLE



JUMP



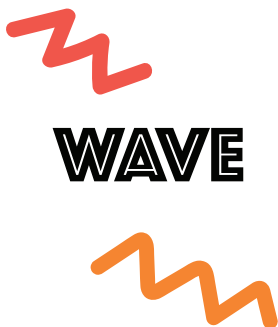
BEND



STOMP



WAVE



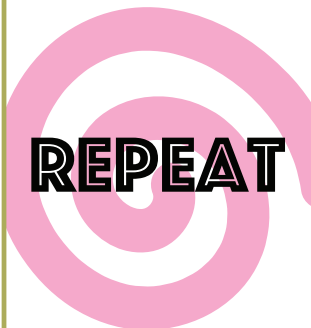
STRETCH



TWIST



REPEAT



2x



REVERSE

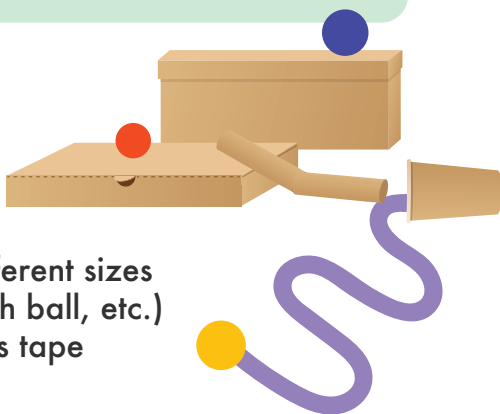


BALL MAZE

You don't have to buy expensive STEM toys. You can make your own using recycled materials in a few quick steps. By creating it together, you will help children build their very own piece of technology.

Supplies:

- Clean recyclable containers of all different sizes: (paper towel tubes, milk cartons, boxes, etc.)
- Age appropriate balls of different sizes (marble, ping-pong ball, plush ball, etc.)
- Packing, masking, or painters tape
- Scissors



Gather a variety of materials from your recycling and around your home to make a ball maze. Keep your child's age in mind. For infants and toddlers, find a medium-sized ball and build ramps and shoots with larger materials.

Invite your child to create a road for a ball to roll from a high point to a low container. Start simple by leaning a piece of cardboard against the couch. As you experiment try:

- Cutting paper towel tubes in half to fit medium-size balls
- Using painter's tape to attach part of your run to the wall
- Creating multiple shoots to sort balls into different bins

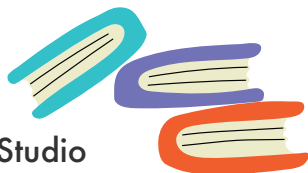


Explore Together:

Follow your child's lead as you play along. Suggesting ideas for expanding on their play can help children stay motivated and enjoy the activity more.

BOOK CORNER

Books are the perfect tool to help children build positive STEM identities. They can provide windows into new ideas and experiences. They can also act as mirrors, reflecting back children's identities and experiences in a way they can relate and connect to. Here are some of our favorites:



Infants and Toddlers:

ABC What Can She Be, By Sugar Snap Studio

Bathtime Mathtime, By Danica McKellar and Alicia Padrón

Drip, by Maggie Li

The Listening Walk, By Paul Showers

Press Here, By Herve Tullet

See, Touch, Feel, By Roger Priddy

Preschoolers and Up:

Ada Twist, Scientist, By Andrea Beaty

A Girl Can Build Anything, By e.E. Charlton-Trujillo and Pat Zietlow Miller

Ask Me, By Bernard Waber

The Most Magnificent Thing, By Ashley Spires

Queen of Physics: How Wu Chien Shiung Helped Unlock the Secrets of the Atom, By Teresa Robeson

Tiny, Perfect Things, M. H. Clark

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