

**BOOK
DROP**



**Family
Guide**

Tips for Engaging Youth
in STEM at Home



Produced By:
Twin Cities PBS



Funded By:
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Welcome to Book Drop!

Book Drop is a new video series where youth and families can enjoy STEM and literacy together!

Book Drop features real kids looking for problem solving ideas with the help of book suggestions from their animated friends, Kitty and Leo! Each episode features a book read by a real STEM professional, like an astronaut, a gardener, or an engineer!

What is STEM?

STEM (Science, Technology, Engineering, and Math) describes an approach to teaching and learning that combines scientific inquiry and engineering design in hands-on personally relevant learning experiences that are grounded in real world applications and integrate technology and mathematics into all aspects of the investigation.

STEM learning opportunities are active and foster skills such as critical thinking, creativity, problem solving, communication, and collaboration. STEM is an important topic in education today because these fields are important growth areas for the economy.

Watch Episodes of Book Drop at:

www.BookDropActivate.org

Why is STEM education so important?

Life Skills

At the most basic level, STEM attempts to answer how and why things work. The scientific and engineering processes offer a framework for understanding important ideas, big and small.

In addition, youth learn how to plan, cooperate, communicate, problem solve, and apply their creativity.

Careers

STEM careers are great careers!

- They offer higher than average salaries and higher expectations for overall job growth compared to other fields.
- By encouraging youth from all backgrounds to enter these fields, these professions will maximize innovation and create products and services that better represent their users.
- A strong foundation in STEM topics will open doors for career opportunities that do not yet exist.
- Confidence in STEM helps prepare youth for a wide range of possible opportunities.

Science Literacy

It's important for everyone to have basic scientific knowledge and to continue to learn and make informed decisions. Even if youth choose to go into another field, a foundation in STEM will serve them well in the future. Science literacy gives us a sense of empowerment to make a difference in our community and the world!

Fun Times

While pursuing their own interests in STEM topics, youth can try new things, meet engaging people, and go to interesting places. Activities such as designing a scientific investigation, creating a solution to a technical problem, or visiting with a scientist or engineer can inspire youth and allow them to see STEM in a different light.

How can you support youth in STEM?

STEM is about asking questions and exploring. Youth can start by being curious about how everyday things work. “What happens when you flip a light switch on? What happens when you use different ingredients when making cookies?”

Infuse STEM into Everyday Activities

Encourage safe experimentation and discovery in the kitchen and outdoors, where youth can practice predicting, measuring, observing, and analyzing.

- Offer basic supplies, Internet access, a library card, and a space where they can make a mess.
- Talk to them about math and science. Think about money, shapes, and measurements!
- Ask about what they’re learning in school.
- Encourage them to share their struggles and successes!

Citizen Science

Public participation in scientific research, also known as citizen science, engages ordinary people (youth and adults) in the collection of data for use by research scientists. Citizen science projects come in all shapes and sizes and cover a wide variety of topics like data collection, data classification, and community based collaborative projects - and they can be done at home!

Explore Citizen Science projects at scistarter.org, zooniverse.org, science.nasa.gov/citizenscience, and birds.cornell.edu/home/get-involved

Invite Questions

Encourage youth’s natural curiosity about the world. Scientists and engineers are professional question askers and problem solvers!

- Don’t be afraid to say “I don’t know,” even when you know the answer.

- Say: “That’s a great question! How can we figure it out?”
- Even if you aren’t comfortable with STEM, be positive and model good question asking.
- Don’t focus on winning or end results. Instead, focus on skills and things they can control. “I like how you are using your senses to observe.” “Its ok that it didn’t work the first time, and I love how you kept trying!”

Encourage Youth to Pursue STEM in School

Expect youth to do well in STEM and communicate your expectations clearly. With the growing importance of science and technological literacy, it is important to spark and strengthen young people’s engagement, interest, and confidence in STEM subjects in elementary and middle school. Help them see the connections between STEM classes and future career options. Start early!

Help Access STEM Opportunities

Great STEM learning opportunities can be found outside the classroom. Science museums, zoos, nature centers, scouting organizations, and STEM clubs and camps are a great place to start! These programs often provide youth with introductions to working mentors who can help them navigate their path to being a scientist or engineer.

Media Watching is a Great STEM Learning Opportunity!

Watch media together as a family. After watching, have a conversation about the things you saw in the video.

- Ask general questions: What was your favorite part? Who were the characters? What did you notice? How did the characters help each other?
- Ask STEM questions: What problem did the characters have? How did they solve the problem? Where did they get their ideas? What could they do next? Does this make you wonder about anything?
- Make career connections: Who was the person reading the book? What do they do for their job? Do we have people like that in our neighborhood? How does their job help people or the world? What tools do they use?

Don’t try to answer all of the questions youth ask, instead ask ‘where could we look?’ or ‘how could we find out?’. There is a lot of power in finding an answer together (even when the adult knows the answer)! This empowers youth to problem solve and ignites curiosity!

Family Activities to do at Home!

Doing STEM-focused activities at home is a great way to build STEM skills, confidence, and interest, AND HAVE FUN! The activities in this guide are related to an episode of Book Drop and are meant to be done together as a family.

Watching the episode of Book Drop together before starting the activity is a great way to introduce youth to ideas in the activities, show examples of getting stuck and needing ideas, and introduce youth to careers.

Blueprint Maker

Draw a bluepring of where you live!

Blueprints are drawings or maps that engineers use to help design new places. They show where all the features are, like doors and windows, the overall shape of the place, and what materials are needed to make it happen. If you were to create a blueprint of your room, what would it look like?

MATERIALS:

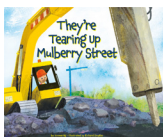
- Paper (blue paper recommended)
- Pencils
- Scissors
- Glue/Tape (optional)

INSTRUCTIONS:

1. Start by drawing an outline of your room. Look around your room. What shape is it?
2. Mark spaces along the outline where doors and windows are.
3. Draw shapes on your blueprint to represent the furniture. Move them around and make them all fit inside the blueprint.



READ THE BOOK:
*They're Tearing Up
Mulberry Street*
by Yvonne Ng



Pick Up Planner

Make a plan for cleaning your room.

Cleaning your room can be fun when you come with a plan! Making a plan before you start a project can help you stay on task and keep you from forgetting important steps.

MATERIALS:

- Paper
- Pencils

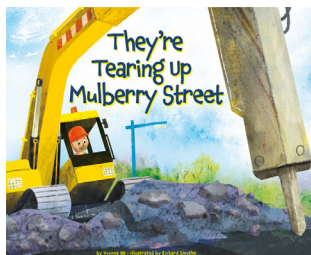
INSTRUCTIONS:

Think about what steps you need to take to get it done and remember, you can have fun when you do it. If you want to add in a dance break, do it! Who will you need to help you clean?

Give them specific instructions so they know what to do. You can also start with a blueprint to see if there are other ways to design your room.



READ THE BOOK:
*They're Tearing Up
Mulberry Street*
by Yvonne Ng



WATCH THE EPISODE:
Watch the Bean Bags & Blueprints episode of Book Drop to learn more about how civil engineers use blueprints and make plans in their construction projects.

Notes for parents:

Taking a big task and breaking it down into smaller parts is an important STEM skill! Is your child working with a sibling or friend to clean up the mess?

Collaboration on a project is another important STEM skill!

Observe the Sky

You can learn a lot about your world by looking up at the sky.

MATERIALS:

- Book Drop field notebook
- Something to look through: cardboard tube, make a tube with a piece of paper and tape, or use your hands!

INSTRUCTIONS:

1. Head outside and look up at the sky. Choose a small area to focus on by looking through a tube or by cupping your hands around your eyes like you're holding a binocular.
2. Draw what you see in your notebook. For example, is it daytime? Are there clouds? If so, what figures do you see in the clouds? Ask about the weather. Is there anything in the sky that might help you know what the weather is like? Can you find the Moon? What shape is the Moon and does it look different from the last time you saw it? If it's nighttime, how many stars can you count? Can you hear or see any animals?
3. Check back throughout the week and observe how the sky changes. Use your notebook to record what you see.

Safety note: Its not safe to look directly at the sun, even when its cloudy! Make sure everyone observing the sky knows they should not look directly at the sun.



READ THE BOOK:
Rocket Says Look Up!
By Nathan Bryon



WATCH THE EPISODE:
Learn about looking at the sky
by watching the Crater Creators
episode of Book Drop.



Note for parents:

Encouraging detailed observations by asking questions is a great way to build STEM skills in youth! Encourage youth to describe what they see and notice similarities and differences. Earth's Moon is often visible during daytime hours, and looking for it can be a great way to encourage observation making!

Sign Maker

Let's Look Together!

Now that you've discovered the wonders of looking up, encourage others to do the same! Create a flyer, poster, or invitation to invite others to look up together.

MATERIALS:

- Something to write/draw on (paper, cardboard, poster board, etc.)
- Something to draw with (markers, pens, colored pencils, crayons, etc.)
- Other fun decorations (stickers, ribbons, glitter, etc.)

INSTRUCTIONS:

1. Choose what kind of sign you want to make. Think about how you want to tell people about the sky. Do you want to give an invitation to a party to look up? Or put up a poster to tell the whole neighborhood?
2. Create! Design a sign that tells others what to look for and why it's so important to look at the sky.
3. Share! Share your sign with others so they know to look at the sky.



READ THE BOOK:

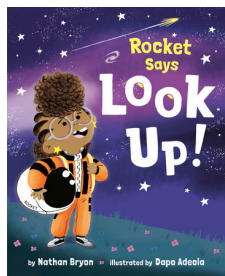
Rocket Says Look Up!

By Nathan Bryon



WATCH THE EPISODE:

Watch Rocket make signs to involve her neighbors in a night sky party in the Crater Creators episode of Book Drop.



Notes for parents:

Making signs, drawing pictures, writing stories, and giving presentations are all great ways to practice the important STEM skills of communication and sharing results!

Sound Searcher

What do you hear outside?

MATERIALS:

- Book Drop field notebook
- Pencils

INSTRUCTIONS:

1. Head outside and listen. Sometimes it helps to make your ears bigger (like a bat's ears): cup your hands around the back of your ears to focus the sound.
2. What do you hear? Can you guess what is making the sound? Can you see what thing or animal is making the sound?
3. Draw or write down what you hear. Make note of what time of day it is.
4. Take a listen over a few days and see if anything changes.



READ THE BOOK:

Fiona the Fruit Bat
by Daniel K. Riskin



WATCH THE EPISODE:

Watch the Echoes and Obstacles episode to learn more about how bats use sound via echolocation to navigate and discover their world.



Note for parents:

Focusing on one sense, like hearing or smell, is a great way to get kids to make detailed observations. Observing and taking notes are both great STEM skills!

String Sounds

Make an instrument!

Sounds are made when things vibrate. Sometimes you can see or hear the vibrations! Try with a rubber band – What happens when you stretch a rubber band and pluck it like a guitar string? Does it make a sound? Can you see it vibrate?

MATERIALS:

- Cups
- Rubber bands

INSTRUCTIONS:

1. Build. Make a simple instrument by stretching a rubber band on a cup so that it goes over the top and bottom of the cup. Play your new instrument by plucking the rubber band. How does it sound?
2. Explore. Do different sizes of rubber bands sound different? What if you use different sizes or shapes of cups? What happens if you pull the rubber band so it's tighter? Does it sound the same?



READ THE BOOK:
Fiona the Fruit Bat
by Daniel K. Riskin



WATCH THE EPISODE:
Watch the Echoes and Obstacles episode to learn more about how bats use echolocation to navigate and discover their world.



Notes for parents:

Making comparisons is an important STEM skill! Encourage youth to say how it sounds the same or different when they make changes to their instrument.

Paper Plane Party

How far can your plane fly?

Making paper airplanes allows youth to use their problem-solving skills. By testing how far their planes can fly, they can try out new ways to make it go farther.

MATERIALS:

- Paper
- Markers, crayons, and colored pencils for decorating

INSTRUCTIONS:

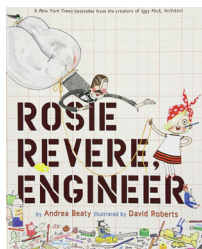
1. Decorate your plane before you build it.
2. Create your plane. Fold your paper in half the long way, then open it back up. Then fold one top corner towards the center crease. Do the same for the other top corner. Do this again, creating larger folds on each side. Next, fold the plane in half again along the same center crease. Finally, fold the top edges down along each side to create wings. (Note: there are many ways to fold a paper airplane. Check for other ideas online).
3. See how far your airplane can fly! Throw your paper airplane across the room. How far did it land? Are there ways to make it fly farther?



READ THE BOOK:
Rosie Revere, Engineer
by Andrea Beaty



WATCH THE EPISODE:
Watch Leo fly his paper airplane in the Build, Test, & Try Again episode of Book Drop



Garden Growers

Part 1: Make a Recycled Planter!

Using recyclable materials is a fun, creative, and eco-friendly way to learn about gardening. Choose your materials and start gardening!

MATERIALS:

- Plant container (plastic bottle, milk jug, egg cartons, etc.)
- Scissors
- Decoration materials (permanent markers, outdoor acrylic paint non-toxic glue, stickers, paper, patterns, ribbon, etc.)
- Soil
- Seeds or plants (herbs, flowers, vegetables)

INSTRUCTIONS:

1. Create a design for your planter. Cut and shape your plant container into the size you want it to be (if needed). Make sure there's enough room for soil based on the plants/seeds you want to grow.
2. Decorate it!

Part 2: Watch It Grow!

INSTRUCTIONS:

1. Think about what you want to grow. Investigate how much soil, water, and sunlight your plant will need.
2. Fill the container with the soil and add your plant/seed.
3. Add water and place in an area that will meet its sunlight requirements.
4. Check on the planter occasionally to see if it needs water and how your plants are growing!



READ THE BOOK:

Jayden's Impossible Garden
by Melina Mangal



WATCH THE EPISODE:

Watch the Nature Detectives episode of Book Drop to learn more about gardens and using recycled planters.

