STORY-LED STEM LABS:

BRINGING NONFICTION ALIVE IN THE LIBRARY

MARY BOONE

WASHINGTON STATE LIBRARY ASSOCIATION CONFERENCE, 2026

Yes, This Matters!

There was a time when nonfiction was straightforward and, perhaps, a little boring. Well, I'm here to tell you: Those days are long gone. But getting young readers engaged in nonfiction can still be a challenge. No more!

This handout features a dozen recent nonfiction picture books and middle-grade books AND provides an easy-to-replicate, low-cost, hands-on activity to go with each one. Some of the projects have been around for decades, but I've put a spin on them that makes them even easier to do. Material lists and step-by-step instructions are included. Adjustments can be made depending upon the age of participants. You can even make them into family activities. Perhaps you'll want to tie these activities to special celebrations, such as National Environmental Education Week in April, World Oceans Day in June, or National Aviation Day in August.

Yes, some kids go to schools where experiments like this are conducted on a regular basis. Others have parents who take them to science centers or museums. Most kids, however, are not that lucky.

Your hands-on program about sound waves or edible insects could be what it takes to get a child interested in reading nonfiction (YAY!) or science (YAY!) Or it could be what makes them start wondering about the world around them (That's worthy of a DOUBLE YAY!)

Librarians are already doing so, so much. I know that. But this is the kind of work that can change lives.

Trust me, young readers will be forever grateful.

– Mary Boone

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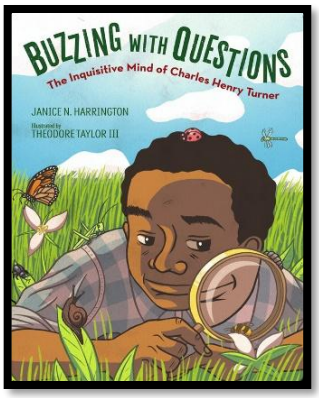
Buzzing with Questions: The Inquisitive Mind of Charles Henry Turner



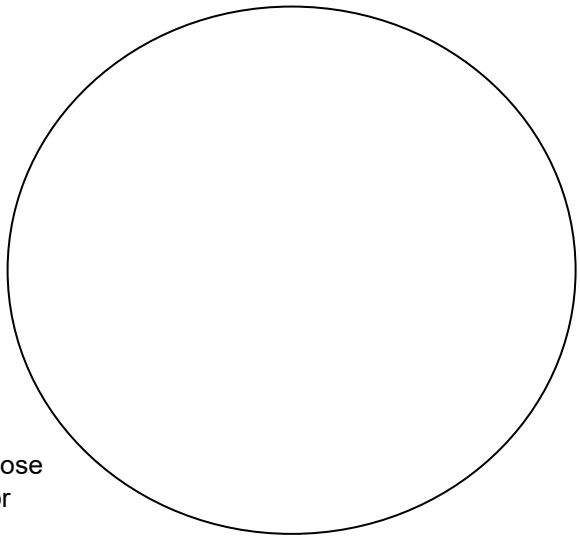
Written by Janice N. Harrington, illustrated by Theodore Taylor III. Released 2019 by Calkins Creek/Boyds Mills. Picture book biography. ISBN 978-1629795584

Charles Henry Turner was a curious child whose teacher encouraged him to "go and find out" the answers to his many questions – specifically about nature. He LOVED to study insects and birds around his neighborhood. He attended college when most colleges didn't accept African Americans. He became a top entomologist, known for his studies of bees, ants, and spiders.

Hands On Activity: Make Your Own Magnifying Glass

Materials & Tools Needed:

Cardstock scrap	Empty, clean, clear plastic bottles
Permanent markers	Hot glue gun and glue sticks
Scissors	Tub of water



Do ahead:
Using the template on this page, create some cardstock circle patterns. Assign several adult or older teen helpers to staff several hot glue stations.

And then:
Ask participants to use a marker to draw around the circle pattern and onto the bottle. They need TWO circles. Encourage them to choose a part of the bottle with no pattern. The "shoulder" of the bottle is often the best spot because it is naturally curved.
Using scissors, participants should cut out their circles, staying as close to the marked lines as possible. *An adult may need to use a knife or pointed scissors to break through the plastic so kids can cut.

Once both circles are cut out, participants match up their circles with curved sides out. They will be convex – like an M&M candy. Then, onto one of the glue stations.

Volunteers will run a thick bead of hot glue around the edges of the plastic circles, leaving an inch open. Be careful not to miss a spot. Allow the glue to dry for 30 seconds before handing back to participants.

Participants take their glued circles to the tub of water. Lower the circle into the water so the open, unglued spot is toward the top. Gently squeeze the circles; release to let water flow in. You want the circle container to be as full as possible without overflowing.

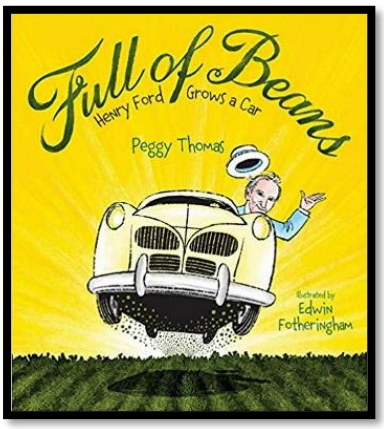
Wipe off excess water and head back to the glue station.

Volunteers glue the remaining part of the circles closed.

Participants can use their DIY magnifying glasses to examine anything they want: Plants, text in books, their fingernails or shoestrings.

Follow-up:
Encourage participants to experiment with their magnifying glasses. Have them look through them with both eyes open and then with one eye closed. Have them hold it at various distances from their eyes.
What can participants notice about a leaf using their magnifying glass that they couldn't see without it?

Full of Beans: Henry Ford Grows a Car



Written by Peggy Thomas, illustrated by Edwin Fotheringham. Released 2019 by Calkins Creek. Informational picture book. ISBN 978-1629796390

Most people know about Henry Ford's famous Model T, but this book focuses on his determination to battle The Great Depression by finding new uses for farm crops. He built a lab and hired researchers who developed soybean-based paint, fabric and – yes – a lightweight plastic that could be used to make cars.

Hands On Activity: Let's Make Soy Plastic

Materials & Tools Needed:

Cornstarch	Microwave
Soybean oil	Water
Resealable plastic sandwich bags	Eyedropper
Liquid food coloring	Tablespoon measuring spoon
Small cookie cutters	Small paper plates

Do ahead:
Set up stations for sandwich bags, cornstarch, soybean oil, water. Depending upon age of participants, you may want to assign a volunteer to the cornstarch, oil, and water stations to help with measuring.
Move microwave to an accessible spot. Assign a volunteer to operate the microwave.

And Then:
Have participants start by opening their sandwich bags. They will move from station to station, gathering:

- 2 tablespoons cornstarch
- 5 drops soybean oil
- 2 tablespoons water

Participants then seal their bags and knead them until the ingredients are thoroughly mixed.

Participants open their bags and add 3 to 4 drops of food coloring to their dough.

Reseal seal bags. Dough should be kneaded until color is incorporated.

Open the seal on one corner of the bag – just an inch or two.

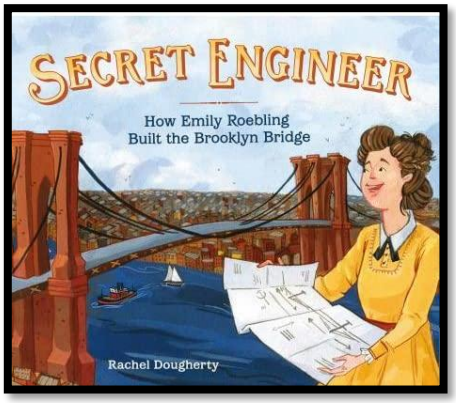
Microwave bag and contents for 30 seconds on high. Have an adult or older teen volunteer assist. Bag will be HOT and must be handled with care.

When cool enough to handle, participants can remove the cornstarch/soy oil mixture and see what shapes they can form, or they can cut shapes using small cookie cutters.

Shapes can be transported home on small paper plates. Depending upon thickness, shapes will harden in 24 to 48 hours.

Follow-up:
You just made a bioplastic. Bioplastics are plastic materials produced from renewable sources, such as vegetable oils, straw, or sawdust.
Ask participants: Can you think of advantages and disadvantages of bioplastics?

Secret Engineer: How Emily Roebling Built the Brooklyn Bridge



Written and illustrated by Rachel Dougherty. Released 2019 by Roaring Book Press/Macmillan. Picture book biography. ISBN 978-1250155320

Emily Roebling's husband had been hired as the chief engineer working to build the Brooklyn Bridge. He worked long and hard but soon became so ill he couldn't even travel to the construction site. For more than 10 years, Emily was his go-between, bringing daily plans to the work site and reporting progress back to her husband. She taught herself to interpret equations and drawings, and she was able to answer workers' questions. In 1883, to calm the public's fears, she proudly took the first trip across the bridge.

Hands On Activity: Bridge Building Challenge

Materials & Tools Needed:

Plastic straws (not the bendy kind)	Pencils
Masking tape	Scissors
2 paper cups, each filled with 50 pennies	Ruler
Scratch paper	Award certificates, optional (Template included in packet)

Do ahead:
Create a simple illustration showing the 6 basic bridge forms: beam, truss, arch, suspension, cantilever, and cable-stay. OR find pictures of bridges using each of these forms.

And Then:
After reading *Secret Engineer*, show participants the basic bridge forms. Then show them a picture of the Brooklyn Bridge. It's a combination of two bridge forms. Can they figure out which? (Answer: Cable-stayed and suspension)

Tell participants about the bridge challenge they're about to take on:

- Working alone or in small groups, they're going to build a bridge using only straws and tape.
- The bridge can be any form or combination of forms.
- Straws can be cut to any length.
- The bridge platform must be at least 4 inches long and 2 inches off the ground or table surface.
- The bridge must be strong enough to hold a cup filled with 100 pennies.

Encourage participants to sketch out a plan before they start building. After which bridge form are they going to model their design?

As building begins, make yourself available to answer questions, offer advice, and generally cheerlead.

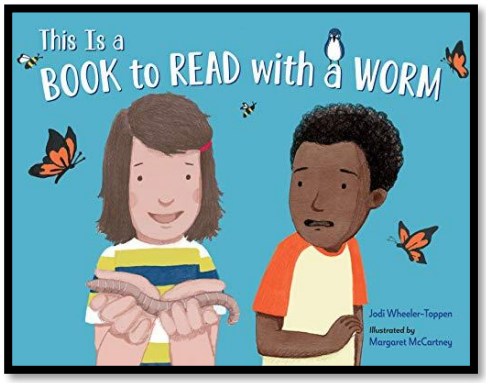
As each bridge is completed, "test" it by seeing if it's strong enough to hold the cup of pennies. If it's not, send designers back to the drawing board. If it is, challenge participants to design a bridge that can hold 2 cups of pennies at the same time. If older participants finish early, ask younger participants if they'd like help.

Award certificates to all participants. You can honor them in categories such as: sturdiest bridge, bridge most like to withstand a hurricane, best-looking bridge, tallest bridge, longest bridge, etc. Be creative!

Follow-up:
Which bridge design held up the best? Which was the worst? Why?
What design concept or shape did the most and least successful bridges follow?

This Is a Book to Read with a Worm

Written by Jodi Wheeler-Toppen, illustrated by Margaret McCartney. Released 2020 by Charlesbridge. Nonfiction picture book. ISBN 978-1580898973



With the aid of this book – and a worm – young readers can become scientists, asking and answering questions about earthworms. Readers learn to think like a scientist and handle living things with care.

Hands On Activity: Get Up Close with a Worm

Materials & Tools Needed:

Worms (you can purchase these from a bait shop)
Spray bottles filled with water
Paper towels
Resealable sandwich bags
Flashlights (cell phone flashlights will work)
Rubbing alcohol
Cotton swabs
Paper
Tape
Clean single serve water bottles, tops cut off
Bag of soil
Aluminum foil
Handwashing station or sanitizing hand wipes

Do ahead:

Gather additional WORM -themed books to display. Some possibilities:

- *Wiggling Worms at Work* written by Wendy Pfeffer, illustrated by Steve Jenkins
- *The Worm Family Has Its Picture Taken* written by Jennifer Frank, illustrated by David Ezra Stein
- *Wiggling Earthworms* by Laura Hamilton Waxman
- *Worm Loves Worm* written by J. J. Austrian, illustrated by Mike Curato

And Then:

The great thing about this book is it basically leads you through the hands-on activities, step by step. Yes, it's that easy. But very few kids are going to have had the opportunity to actually try these things in a class filled with 30 students so, let's experiment at the library!

I suggest you spread participants out at tables and work through each activity as it's mentioned. A couple of helpers will make this go smoother. One person can read, then you'll take a break to do/try what's described.

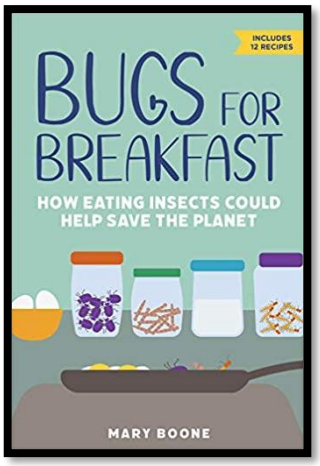
Before you even start reading, give each participant a paper towel and have them spray it with water. Then give each child a worm and a sandwich bag. As you read, take breaks so participants can really observe their worms. Who has an adult worm? Who has a kid worm? Can everyone find their worm's head?

Distribute flashlights. What do worms do when light is shined on them? Distribute cotton swabs dipped in alcohol. Have participants smell them first. Then see how the worms react to the smell of alcohol. Just before participants head home, give them each a single-serve plastic bottle with the top cut off and a sheet of aluminum foil. Let the kids fill the bottles ¾ of the way up with soil (add water if the soil is dry). Deposit the worms and cover the container with foil – top, bottom, and sides.

Follow-up:

Read the last section of the book with participants and tell them they're going to take home their worms and check in the morning for tunnels. If you dug up the worms, tell participants they can deposit their worms in a nearby flowerbed. If you purchased fishing worms, ask them to give their worm to a fisher friend.

Bugs for Breakfast: How Eating Insects Could Help Save the Planet



Written by Mary Boone. Released 2021 by Chicago Review Press. Middle-grade nonfiction. ISBN 978-1641605380

This book is all about entomophagy, the practice of eating insects. People have been doing it for centuries, but there's new interest in the practice in Western cultures because the world's population is growing and feeding all those people is a real concern. This book touches on topics including: agriculture, sustainability, climate change, water scarcity, world hunger, and world cultures.

Hands On Activity: Try It, You May Like It

Materials & Tools Needed:

Roasted crickets and/or grasshoppers/mealworms
Store-made brownies
Cricket protein brownies (Tricky Cricky is a good option)
Colored cupcake wrappers
Paper
Pencils

Do ahead:
Place roasted insects into cupcake wrappers for ease of serving. Divide cookies into sample-size portions; use the different colors of cupcake wrappers to divide the cricket protein snacks from the non-cricket snacks.

And then:
As participants arrive, talk to them about edible insects. Tell them one out of every four people in the world routinely eats insects. You may want to use a map and info from the book to indicate which types of insects are being eaten in which regions.

There is now a movement in Western culture to introduce more edible insects into our diets. Why do participants think that is happening? *To feed a growing world population; it takes less space and fewer resources to grow insects than cows or pigs; they're nutritious; they're delicious.*

****Students with shellfish allergies should not taste the samples and should take care handling the samples. Insects have exoskeletons – just like shellfish. If you have an allergy to shellfish, you may also be allergic to insects. Exercise caution.*** *

Hand out paper and pencils.

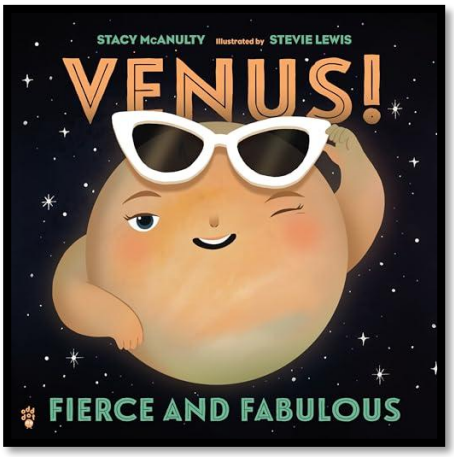
Beginning with the two cookie samples – one made with cricket protein, one without – ask participants to record their findings regarding appearance, texture, smell, and taste. They should complete observations about one sample before trying the second..

Gather participants to ask which sample they think contained crickets and which did not. How did they reach their conclusions? Did they rely on visual and olfactory inspection as well as taste and texture? If you want, you can also have participants sample whole roasted insects. Can they taste a difference between mealworms and crickets, for example?

Follow-up:
Crickets can be ground into a fine powder and incorporated into many types of recipes. What other products could insect powder be added to? Have students think about the foods they eat. Have each participant draw a picture or write a recipe showing how they'd add insects to a favorite food. Kraft Mac & Crickets anyone?

Venus! Fierce and Fabulous

Written by Stacey McAnulty and illustrated by Stevie Lewis. Released 2026 by Odd Dot. Informational fiction picture book. ISBN 978-1250334473



Get ready to meet the solar system's most glamorous resident as Venus spills all her secrets of the solar system in this witty and informative picture book. Discover what makes Venus truly unique: She's intensely hot, a little stinky, and her breathtaking, shimmering brilliance shines in the night sky. This book is part of the Our Universe series.

Hands-On Activity: Straw Rockets

Materials & Tools Needed:

Rocket template (included here)
Tape
Drinking straw
Measuring tape (optional)
Scissors
Pencils
Markers/Crayons (optional)

Do ahead:
Make copies of the rocket template. It is likely each participant will want to make more than one.

And then:
As participants arrive and settle, read *Venus! Fierce and Fabulous*. Ask them what they know about space exploration and rockets.

Share this information:

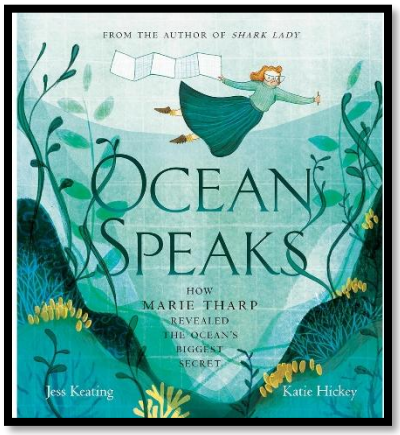
- Modern rocket design began near the beginning of the 20th century.
- Show photos from this packet of 1950 vs 2026 rocket design.
- While much has been learned, rocket designs are still improving.
- By changing just one design feature at a time, engineers can figure out if that change improves performance.

Have participants cut out the long rectangle from their rocket template. They may opt to decorate this rectangle. This is the body of the rocket. After writing their name on the rocket body, they should wrap it around a pencil lengthwise and tape it closed to form a tube. Have students cut out the two fin units. Align the rectangle in the middle of the fin with the end of the rocket body and tape it to the rocket. Repeat on the other side Next, twist and pinch the top of the rocket body around the tip of the pencil to create a "nose cone." Tape the nose cone to prevent air from escaping. Have students remove the pencil and replace it with the soda straw.

In a designated launch area, away from people, ask each participant to blow into their straw to launch their rocket. How does it fly? After several flights, encourage them to alter their rocket. Will it fly further with a shorter nose cone? What if the fins were shaped differently? Encourage them to make just one change at a time and allow time for more test flights.

Follow-up:
Gather your engineers to ask what features seemed to help their rockets fly furthest and fastest? If they could make another change to their rockets, what would they alter next? If you have extra templates, offer them to participants for at-home engineering.

Ocean Speaks: How Marie Tharp Revealed the Ocean's Biggest Secret



Written by Jess Keating and illustrated by Katie Hickey. Released 2020 by Tundra Books. Picture book biography. ISBN 978-0735265080

This book tells the story of oceanographer Marie Tharp, who mapped the ocean floor and discovered the Mid-Atlantic Ridge. The book highlights Tharp's perseverance as a woman in science, detailing how she created the first map of the ocean floor from her desk, revealing a massive rift valley that proved plate tectonics. It's praised for its engaging storytelling, strong feminist message, and for making complex science accessible to young readers.

Hands On Activity: Let's Map the Ocean's Floor

Materials & Tools Needed:

Small cardboard boxes
Clay
Wooden Skewers
Rulers
Graph paper
Tape
Color pencils

Do ahead:
Cover the bottom of each cardboard box with clay, creating valleys and mountains as you go. Allow the clay to dry completely. Tape a sheet of graph paper (squared as much as possible) to the top of each box. You'll want enough boxes so that no more than three participants have to share.

And then:
Once participants have gathered, read *Marie's Ocean: Marie Tharp Maps the Mountains Under the Sea.* Discuss the fact that Marie never got to go down to the bottom of the ocean. But she was able to use sonar readings to create the first maps of the ocean floor.

Divide participants into small groups. Give each group a covered cardboard box, a skewer, a ruler, colored pencils, and a sheet of graph paper. Explain that they are going to pretend the skewers are sonar.

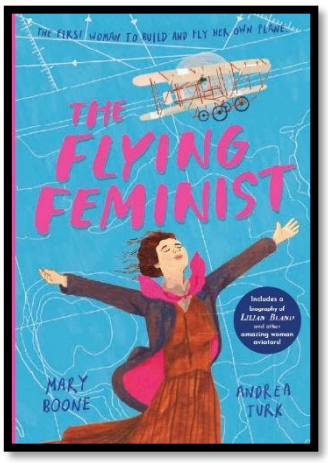
Each group should use the ruler and colored pencils to create measurement marks on their skewer.

As a group, they can use their skewer to make 12 probes through the graph paper (which represents the ocean's surface) to the clay (which represents the ocean floor). They should observe how deep each skewer goes before hitting the bottom. Each time the probe is inserted, the group should write down their measurement on their extra sheet of graph paper.

As each group completes their probing and measuring, they should use a dark purple pencil to color the areas they think are deepest. The tallest mountains they measured should be colored red. Once they've colored the highest and lowest areas, they can take the covers off their boxes. How accurate is their representation of the ocean valleys and mountains?

Follow-up:
Gathering discussion: Was mapping something you couldn't see difficult? Why is it important for us to know what the ocean floor looks like?

The Flying Feminist



Written by Mary Boone, illustrated by Andrea Turk. Released May 2026 by Andersen Press. Picture book biography. ISBN 978-1839135101

At a time when women were expected to conform, Lilian Bland didn't fit in – she wore trousers, enjoyed fishing, and worked as a sports journalist. Inspired by the flight of the wild birds she loved to photograph, in 1910 she defied convention and became the first woman to design, build, and fly her own airplane, earning her the nickname: The Flying Feminist!

Hands On Activity: Paper Airplane Flying Competition

Materials & Tools Needed:
Paper (several colors will make it even more fun)
Pencils
Award certificates, optional (Template included in this packet)

Ahead of time:
Familiarize yourself with how to make a very basic paper airplane so you can lead participants through their first series of folds. You may also want to print out several sets of folding instructions for additional types of paper airplanes.

And then:
Start by distributing paper to all participants. Encourage them to follow along as you work step-by-step to fold a basic paper airplane. IMPORTANT: Ask everyone to write their name on their plane so they can keep track of it.

Once everyone's first plane is complete, gather them for flying. Give everyone a couple of tries to fly their plane. What might make their plane fly faster? Further? Higher?

Head back to your folding stations. Offer that you have instructions for other plane designs or participants might want to come up with their own design. Give everyone time to fold. Have participants write their names of their planes.

Head back to the flying station (outdoors, down a hallway, from a balcony – perhaps you'll want to try several different locations). Have participants fly their planes one at a time, calling out the best qualities of each: Good looking design, fast-flier, curviest flight, etc.)

Head back in for one last folding session. What improvements can they make to their first two designs?

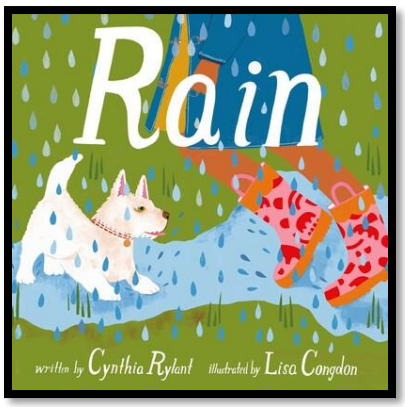
For your last flying session let participants bring all three of their planes. Before each participant launches his/her planes, ask them to guess which will fly furthest or highest. Let them fly and see if they're correct.

Follow-up:
This truly is the simplest, cheapest hands-on activity, but kids love it. You can make it even more fun by offering airplane stickers or certificates to those whose planes fly a specified distance.

Before the event ends, gather participants to ask: Did anyone's plane crash? Did anyone have a plane that was kind of a dud? Talk about how not all designs are successful. Remind participants that learning from those duds helps make a better product the next time around.

Rain

Written by Newbery Medalist Cynthia Rylant and illustrated by Cynthia Rylant. Released 2023 by Beach Lane Books. Nonfiction picture book. ISBN: 9781442465091.



Rain can dampen the fun on an outdoor playday. When rain is on its way, some people and animals hurry home and get cozy inside. But others stay out to soak up the glorious showers! Wet drops bounce on leaves and roofs, creeks fill up, trees take a shower, cats have a show, and *everyone* relishes the rain. This lyrical picture book helps readers understand how and why rain is good for everyone.

Hands On Activity: DIY Rain Gauge

Materials & Tools Needed:

- Empty 1-liter plastic bottles
- Stones or marbles
- Masking, duct, or painter's tape
- Permanent markers
- Scissors or knife
- Rulers

Ahead of time:
Recruit an adult or two to help with cutting bottles.

And then:
Talk about the weather. Introduce weather-related words as you encourage children to describe the weather. Ask them about different words that can be used to describe rain: Showers, sprinkles mist, downpour, deluge, torrent, drizzle, mist, etc. Talk about why rain is needed and what participants like to do on rainy days.

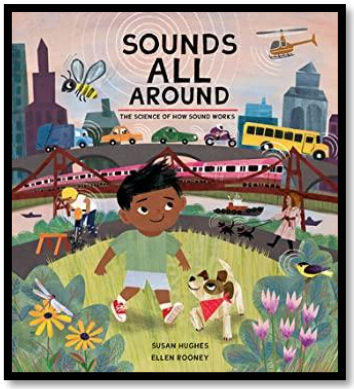
After reading *Rain*, give each participant a clean, clear bottle. Have them remove the labels from the bottles and throw away the caps. Have AN ADULT carefully use scissors or a knife to cut the top off of the bottle, starting just where the bottle starts curving inward toward the cap. The plastic edges may be sharp — handle with care!

Each participant should place a few stones or marbles into the bottom of their bottle. This will weigh down the rain gauge your gauge when it is outside. Turn the top portion of the bottle upside-down and place it into the neck of the bottom section, pointing downward. This will serve as a funnel, directing rainfall into the gauge. Use tape to secure the two pieces of the bottle together and cover sharp edges.

Pour a small amount of water into the bottle, until it just covers the top of the stones or marbles.
Hold a ruler to the side of your gauge, making sure that the 0 point lines up with the top of the water. You have just calibrated your gauge to measure all rainfall beginning at the top of the water (versus at the bottom of the bottle). Use a permanent marker to make a mark every 1/2 inch from zero (the top of the water) to the bottom of the funnel. Turn the bottle halfway around and repeat the labeling process. Tell participants they need to take their rain gauges home and place them in a good outdoor location – with nothing overhead to block the rain, and where it is not likely to be disturbed or knocked over by pets, wind, or stray baseballs.

Follow-up:
Gather participants to explain that scientists and meteorologists check rainfall at the same times each day. Help older participants create a chart so they can track the rainfall. For each entry, they'll want to record the date, rainfall measurement, temperature, and perhaps a sketch of the cloud cover that day.

Sounds All Around: The Science of How Sound Works



Written by Susan Hughes, illustrated by Ellen Rooney. Released 2021 by Kids Can Press. Nonfiction picture book. ISBN 978-1525302503

This book helps young readers understand sound and its role in our lives. Text explains how sound happens, how we hear it, what makes some sounds loud and some soft, what makes some high-pitched and some low-pitched. The book addresses the many ways humans and animals use sound to communicate and discusses sounds that occur naturally and those created for specific purposes.

Hands On Activity: I Can See Sound

Materials & Tools Needed:

Large glass or metal bowl
Plastic wrap
Rubber band large enough to fit around bowl
Sprinkles (rice also works!)
Recorder, drum, or another instrument
Phone or another way to play music
Cookie sheet or tray

Ahead of time:
This activity can be demonstrated for a large group and then replicated with smaller groups. If you plan to have participants try this themselves, be sure to gather extra bowls and other supplies.

And then:
Explain to participants that sound waves can come from many sources, but the sounds are all transmitted the same way – through vibrations. When a sound is created it causes molecules close to the sound source to vibrate. When one molecule vibrates, it causes the molecules touching them to vibrate too. This continues, from one molecule to the next, passing the energy on as it goes in the form of a wave. We're going to see those vibrations in action today.

Start by stretching a piece of plastic wrap tightly across the top of the bowl. If the wrap doesn't cling to the bowl, use a rubber band to secure it. Adjust it so it is as flat as possible – no wrinkles!

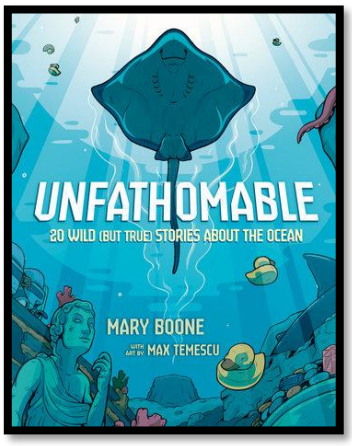
Set the bowl on a cookie sheet (in case you need to capture escaped sprinkles). Carefully spread a spoonful of sprinkles across the plastic wrap.

Have someone stand very near the bowl. Without touching it, play a few notes on the recorder or drum. What happened? Try another instrument. What happens if you play music further away from the bowl?

Play some music through your phone or other device. Start quietly, then make the music louder. What happens to the sprinkles? Can you make the sprinkles move by humming, singing, or clapping near the bowl?

Follow-up:
Gather participants to talk about what they all saw – the differences in what happened according to what types of sounds were being made. Remind them: Sound travels as waves. In this experiment, the sounds they made created sound waves that reached the bowl, disturbed the particles of the plastic wrap, which created vibrations, which caused the sprinkles to move. Cool science!

Unfathomable: 20 Wild (But True) Stories About the Ocean



Written by Mary Boone, illustrated by Max Temescu. Released 2026 by Bright Matter/Random House Kids. Middle-grade nonfiction. ISBN 978-0593904756

Did you know you can survive being swallowed by a whale? Or that octopus wrestling used to not just be a pastime but also an actual sport? Or that once a town in Oregon didn't know what to do with a whale carcass that washed up on their beaches, so they…BLEW IT UP? As strange as it sounds, those stories are 100% true. And the sea holds more secrets. Grab your snorkel and dive into 20 incredible-but-true tales of survival at sea, sunken treasures hiding under the ocean's surface, jellyfish that live forever, and so much more.

Hands On Activity: Will It Float

Materials & Tools Needed:

Large, clear plastic bin
Water to fill bin ¾ full
Various fruits or vegetables
Aluminum foil
Pennies or marbles
Paper towels

Ahead of time:

Read Chapter 7 and select an excerpt or prepare to share highlights from "Your Ship's Made of What?" – a story about concrete ships. Cut two 3x3-inch squares of foil plus a 12x12-ish inch square for each participant or family.

And then:

Explain to participants that buoyancy is the force that makes objects float in water or other fluids. Whether or not an item floats depends both on how much it weighs and how it is shaped. Show participants which items you're going to test (a carrot, an apple, an orange, a potato are all good options) and have them predict which will sink and which will float. Test the items. An orange is an extra fun test item. What happens if you drop an orange into the water? It floats. Now drop a peeled orange into the water – it sinks. That's because the air pockets and oil content in the orange peel keep the entire orange afloat.

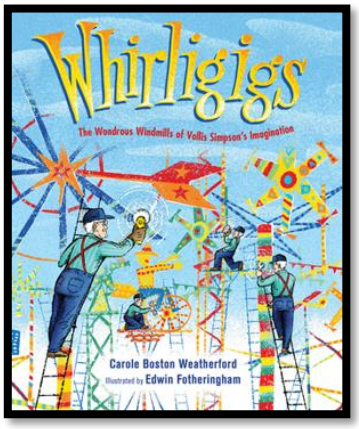
Next place one of the small foil squares on top of the water. Does it float? What happens if you get a little water on top of it? Will it continue floating? Now crumple the other small foil square. What do participants think will happen when you drop it into the water? It floats because, although aluminum is heavier than water, when you crumbled the foil, air got trapped inside and helped the foil float.

Now, challenge participants to use their larger squares of foil to form boats that will float. This can be an individual or small group activity. Allow 5 to 10 minutes for this task. Ask groups to test their designs. Choose one of the floating designs and ask participants what they think will happen if you carefully place marbles or pennies into the boat? If they predict the boat will sink, ask them how many pennies or marbles it will take to sink the boat – then give it a try.

Follow-up:

Gather participants. Ask them to connect their discoveries to real-world engineering by asking: *How do shape and trapped air help giant ships—like the concrete ones in the book—stay afloat?*

Whirligigs: The Wondrous Windmills of Vollis Simpson's Imagination



Written by Carole Boston Weatherford, illustrated by Edwin Fotheringham. Released 2024 by Calkins Creek. Picture book biography. ISBN 978-1662680410

Vollis Simpson was a curious man. He loved to know how things worked and how to fix them. Growing up on a farm in North Carolina, he loved to tinker with machines. And when he served in the Army Air Corps during WWII, Vollis kept on tinkering. His creativity and ingenuity allowed him to build things no one would have thought to create from scraps: a washing machine out of airplane parts and a motorcycle out of a bike. After the war, his passion for metal creations picked up speed--turning into a whirlwind of windmills as far as the eye could see.

Hands On Activity: Make a Whirligig

Materials & Tools Needed:

String
Cardboard scraps
Glue sticks
Scissors
Scissors
Kitchen skewer(s)
Markers and/or crayons
3- to 6-inch bowls to trace around

Ahead of time:
Trim cardboard into 6- to 8-inch squares (old cereal boxes work great). Cut string into one-yard sections (enough so that each participant gets one) Read *Whirligig* to participants and invite them to make their own whirligigs.

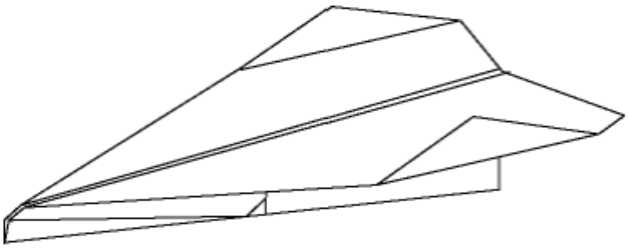
And then:
Each participant will need two cardboard squares. They should trace around a bowl to create a circle outline on each square. Ask participants to cut out the circles and decorate them with markers – spirals, lines and checkerboards look great. Once they are decorated, glue circles together, decorated sides facing out.

Next, with adult help, participants should use a skewer to poke two holes in their circle – about an inch apart and an equal distance from the center of the circle. Instruct participants to thread string through one hole and then back through the other hole; tie a knot in the string to form a loop.

Holding each end of the string, spin the Whirligig. Once the string is tight, gently pull your hands apart, then push them together to make the button spin fast, creating the "whirring."

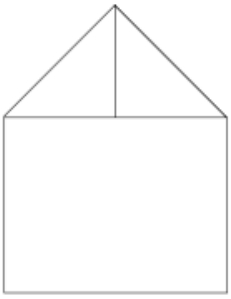
Follow-up:
Gather participants and let them show their whirligigs in action. Ask them to reflect: What makes the whirligig spin faster? Slower? If time allows, provide extra materials for participants to redesign or upgrade their whirligigs. They might try different sizes, different shapes, different string lengths, or hole placements.

Classic Dart

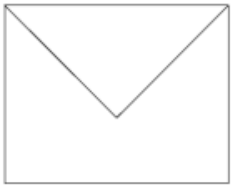


This plane is the classic schoolyard dart. It has short, compact wings and will fly straight as an arrow. It generally needs some up elevator along the back wing edges to fly properly.

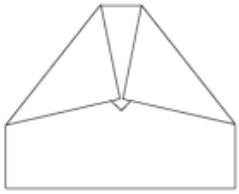
Orient the template with the "UP" arrow at the top of the page. Then, flip the paper over onto its backside, so that you cannot see any of the fold lines.



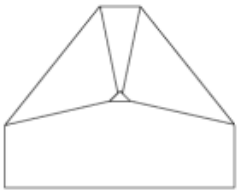
Pull the top right corner down toward you until fold line 1 is visible and crease along the dotted line. Repeat with the top left corner.



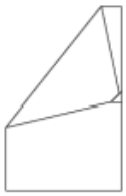
Fold the top point down toward you until fold line 2 is visible and crease along the dotted line.



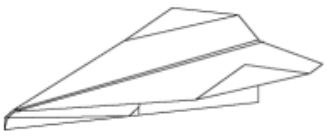
Fold the top left and top right corners down and toward you and crease along fold lines 3.



Fold the tip up and over the two diagonal folds along fold line 4 to secure them in place.

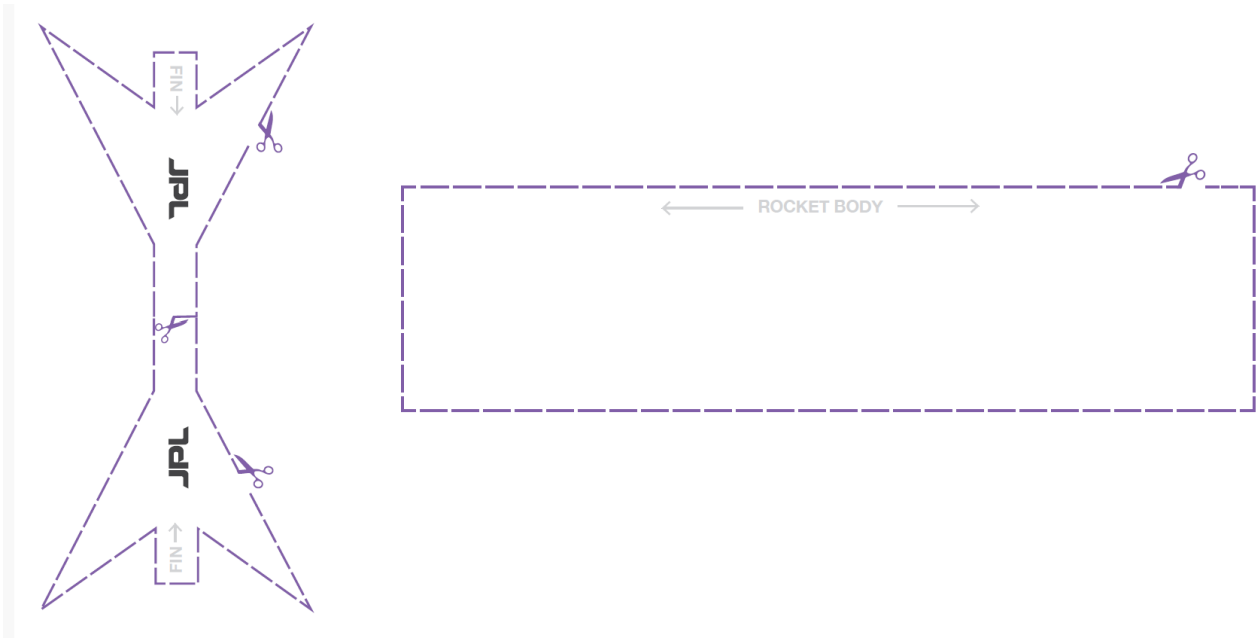


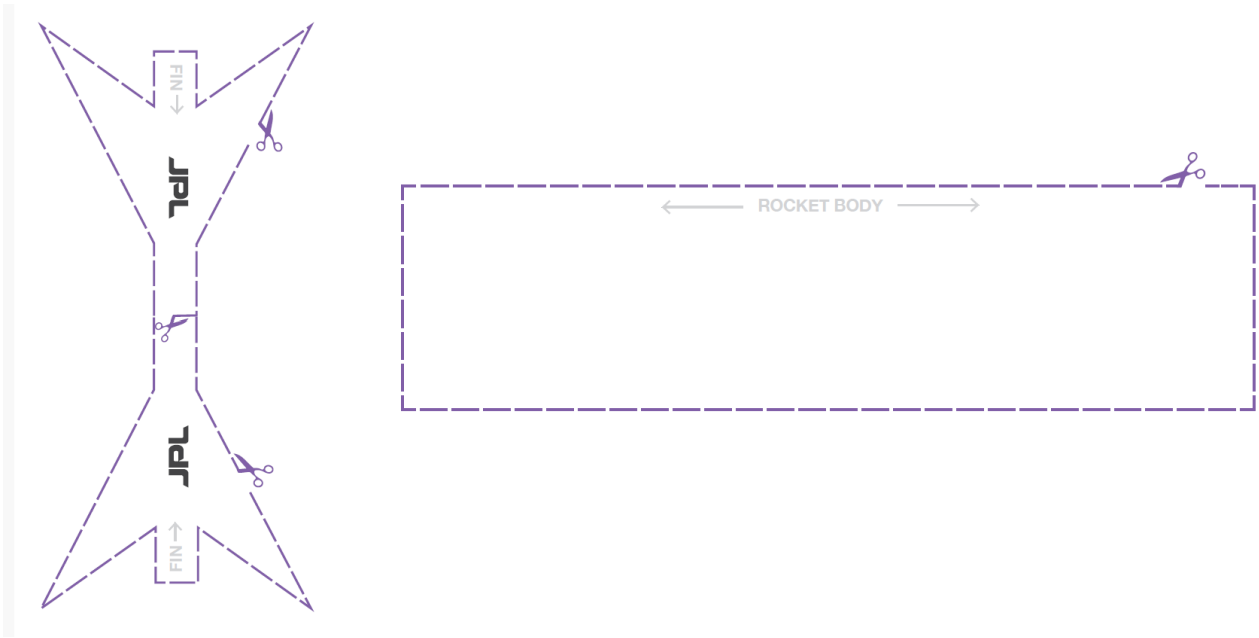
Flip the plane over and fold the right side over onto the left side as shown along fold line 5 so that the outside edges of the wings line up. Also make sure the diagonal folds do not become untucked from the tip you folded up in the previous step.



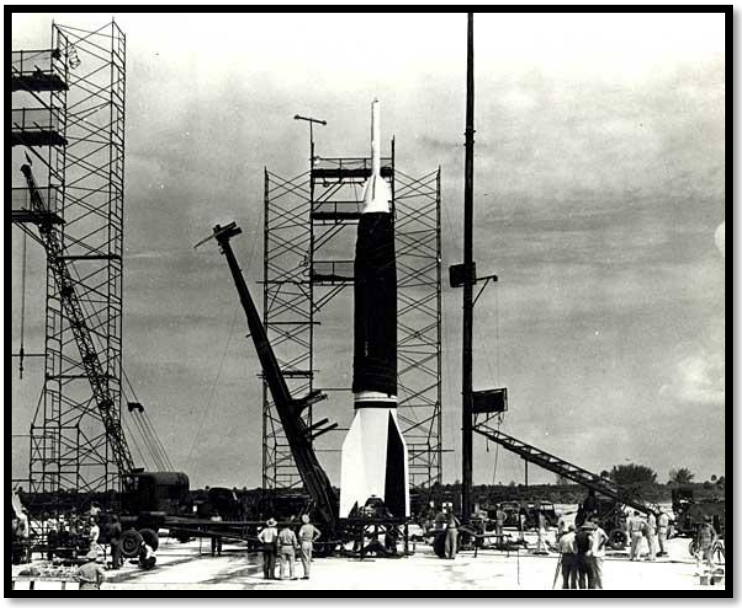
Fold the wings down along fold lines 6 and the winglets up along fold lines 7. Add wing dihedral by tilting the wings up slightly away from the fuselage. The wings will have a slight "V" shape when viewed from the front. Cut two slits, one inch apart, along the back edge of each wing to make elevator adjustments. Start out by trying some up-elevator. You are ready to fly!

Source: National Air and Space Museum





Source: NASA Jet Propulsion Lab

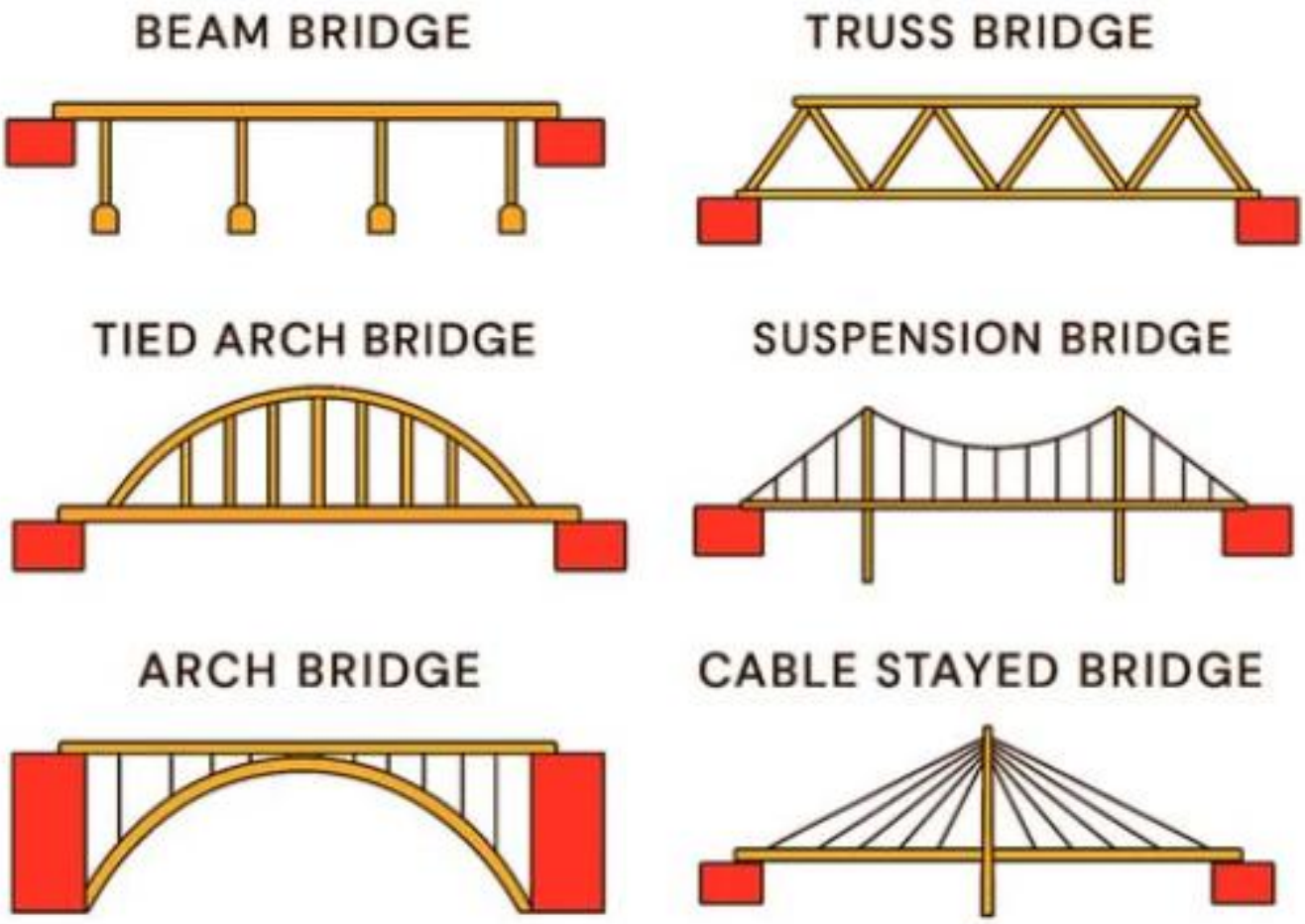


Bumper 8, 1950

Artemis II, 2026

Source: NASA

Six Basic Bridge Structures



Source: American Society of Civil Engineers

ENGINEERING CHAMPION

This award is given to

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