

Sample STEM lessons

Science: Nature Walk

Book: *Step Gently Out* by Helen Frost ©2012, Candlewick.

Supplies:

- Magnifying glasses
- Plastic baggies or envelopes to collect small treasures
- Paper
- Peeled crayons
- (optional) nature guidebooks (tree identification, bugs, birds, etc.)
- (optional) printable picture scavenger hunt such as:
<http://babyccinokids.com/blog/2013/10/18/the-little-things-a-nature-scavenger-hunt/>

Activity Ideas:

1. Describe it: Each thing that you discover in nature has different characteristics – is it smooth? Rough? Hard? Soft? Wet? Dry? These descriptors are the building blocks that help scientists identify different species and learn more about them.
2. Bark rubbings: Place the piece of paper flat against a tree trunk and rub the side of the peeled crayon over the surface. Watch as the texture of the tree bark appears on the paper. Talk about whether the bark is rough or smooth. Caution kids not to peel too much tree bark off the trees as it is the tree's skin and losing too much bark can hurt the tree!
3. Evergreen or Deciduous? : Before you go outside, teach kids the difference between evergreen and deciduous trees (the leaves fall off of deciduous trees during the winter, evergreens keep their leaves (or needles) year round). "Deciduous" is a great vocabulary word to teach the kids! While it's not important that they know tons of scientific terminology at this age, one or two fancy words can make them feel very knowledgeable and really impress the grown-ups when they use it in conversation!
4. Magnifying glasses: While it would be awesome if you had access to a class set of high-quality magnifying glasses, if you don't, even toy magnifying glasses will help to focus kids' attention and remind them to look closely at the world around them.
5. Look it up/write it down: If you do have access to a few nature identification books, try looking up a tree or a leaf or a bug. Talk about how each kind of tree, plant, bug and bird has its own name. Note what you find, or try a scavenger hunt.

Related app:

Plum's Photo Hunt by PBS Kids is a photographic nature scavenger hunt using your smartphone. With open-ended prompts like, "take a picture of shadows" or "find some roots" the game can be played over and over again!

Technology: Clothespins

Book: *Mrs. McNosh Hangs Up Her Wash* by Sarah Weeks ©1998, HarperFestival.

Supplies:

- Wooden or plastic clothespins
- Clothesline (or heavy duty string)
- Felt or paper or doll “clothes”
- Pom-poms
- Animal shapes missing the legs (can be die-cut or print and cut out)
- Baby bird puppet or a picture of baby birds with open beaks
- Egg cartons

Activity ideas:

1. **Stand up!:** Pin the clothespins to the legless animal shapes to give them legs! (<http://www.estefimachado.com.br/2012/04/zoologico-de-pregadores-de-roupa.html>)
2. **Clothespin Geometry:** Clip the clothespins to each other end-to-end, and create different shapes (triangles, squares, etc.) depending on how many clothespins you use. <http://www.kcedventures.com/blog/fun-hands-on-math-activities-get-creative-with-clothespins>
3. **Dramatic Laundry Play:** Pin the “clothes” to the clothesline (strung between two tables or chairs or whatever is convenient in your room).
4. **Clothespin Claw Machine:** – use a clothespin to pick up pom-poms and drop them into the different compartments of an egg carton. <http://handsonaswegrow.com/strengthen-fine-motor-skills-clothespins/>

More activity ideas:

1. Feather clothespins: <http://www.teachpreschool.org/2011/12/exploring-birds-that-are-not-alike-in-preschool/>
2. Bunny clothespins: <http://www.stillplayingschool.com/2014/04/clothespin-bunnies-fine-motor.html>
3. Clothespin sharks: <http://www.theseasonedmom.com/clothespin-sharks/>
4. Clothespin catapults: <http://littlebrightsparks.blogspot.com/2013/05/happy-frog-jumping-day.html>

Bonus educational benefits:

Practicing your pincer motion by open and closing clothespins strengthens the same muscles in your fingers and hand that children will need when they learn to write! These activities include lots of great fine motor skills practice and there are tons of opportunities for pretend play which strengthens narrative skills.

Engineering: Air Movers

Book: *Like a Windy Day* by Frank Asch © 2002, Gulliver Books. (or wind-related book)

Supplies:

- Plastic drinking straws
- Hairdryer with a cool setting (at least a “cool shot” button that can be taped down)
- Lightweight round things (ping pong balls, Styrofoam balls, plastic eggs, etc.)
- A variety of objects that can and cannot be moved with wind (e.g. pom-poms, rubberbands, toy cars, milk jug lids, scarves, bouncy balls, feathers, wooden blocks, buttons, packing peanuts, wiggle eyes, cotton balls, heavy books, etc.)
- small bucket or bowl (optional)
- waxed paper
- black marker or masking tape
- paper towel roll (optional)

Activity Ideas:

1. **Can I move it with my breath?:** Set up your variety of objects in a line. Give each child their own plastic drinking straw. Ask them to predict whether they’ll be able to move each object just by blowing on it through the straw. Test their predictions. If desired, track their results in a simple chart on a piece of paper. Is there any difference if they don’t use the straw but just blow with their mouth? Which is easier? What if you blow through a bigger tube like a paper towel roll?
<http://www.momto2poshlildivas.com/2011/04/w-is-for-wind-experiment-can-wind-move.html>
2. **Fluffy whirlwind!** Put some feathers into your bucket or bowl. Using your straw, blow some wind down into the bowl and watch your feathers fly!
3. **Water drop mazes:** Draw a few lines across your waxed paper (or just use masking tape to create lines). Make some straight and some squiggly. Drop one droplet of water on the line and challenge the kids to move the drop of water along the line using their breath blown through the straw. *Variation: “cloud races” with cotton balls.*
<http://www.whatdowedoallday.com/2010/06/friday-do-over-blowing-water.html>
4. **Discover the Bernoulli principle:** An adult can hold the hairdryer and turn it on at a cool setting (no heat). Kids can try to balance a lightweight ball or plastic egg on top of the stream of air coming out of the hairdryer. Once it’s balanced, what happens if you slowly tilt the hair dryer? What happens when you place something else in that airstream? How about scarves? Feathers? <http://stella123.com/bernoulli-principle-for-preschoolers/>

More activity ideas:

1. Air pressure experiment with sponges, a plastic baggie and a straw:
<http://kidsactivitiesblog.com/47096/air-pressure-experiment-for-kids-2>
2. Blow a ball through a wooden block maze with the hairdryer:
<http://littlemomentstoembrace.blogspot.com/2012/05/math-can-be-maze-ing.html>
3. Make a pom-pom air cannon:
<http://www.ahappysong.com/2013/02/indoor-fun-puff-ball-air-cannon.html>

Math: Same & Different

Book: *Same Same* by Marthe Jocelyn © 2009, Tundra Books.

Supplies:

- Memory Match Games (many free printable versions online, such as: <http://www.eatdrinkchic.com/post.cfm/diy-paper-popsicle-memory-game>)
- Picture dominoes <http://www.handmadecharlotte.com/diy-printable-dominoes/>
- Tactile Matching Game (make this before class yourself using balloons, funnel and various fillers – beans, lentils, sugar, etc.) Note: these take longer to make than you might think, but they're lots of fun! Just keep them away from babies who like to chew...: <http://tutusandturtles.blogspot.com/2009/08/tactile-matching-game.html>
- Sound matching game (make this yourself before class): <http://www.kidpointz.com/kids-activities/preschool-kindergarten-activities/view/musical-egg-shakers/>
- a container of toys that are all the same shape but different colors (balls, blocks, etc.)
- (optional) Alphabet letters (puzzle pieces? Foam letter for the bath? Cookie cutters? Whatever you have available. If you have upper AND lower case, even better!)

Activity ideas:

1. Play Memory Match! For very young players, just place all pieces right-side up and have them search for matches that way.
2. Play dominoes. For very young players, just match pictures to make a line-up.
3. See if you can match up all the filled balloons that have the same stuff inside. This works well in an egg carton if you made six pairs.
4. Match the pairs of egg shakers that are filled with the same things (also works well in an egg carton).
5. With eyes closed, have kids reach into the container of toys mentioned above and pull out two objects. When they open their eyes, ask if they're different or the same. If they're the same, the player keeps the match. If not, they go back in the bin and it's someone else's turn. <http://preschoolpowolpackets.blogspot.com/2011/11/cover-ball-game-for-preschoolers-and.html>
6. Have the kids sort the alphabet letters by letter, by color (if applicable), by upper or lowercase, by whether or not they have a hole (i.e. "B" does, "L" does not), or whatever makes sense to them! Talk to them about their choices—why are these the same? Why are they different?

Related App:

Fiete Match by Ahoiii is by far the best Memory Match app that I've found among the thousands available on the app market today. There are a wide variety of modes to play and you're playing against a cute sailor character named Fiete who responds with authentic emotion to the gameplay.

Recommended Resources:

See more lesson plan ideas on my blog at <http://librarymakers.blogspot.com>

or my Pinterest page: <http://pinterest.com/carissaabc/wonderworks/>

Find more recommended apps at www.madisonpubliclibrary.org/kids/apps

Got more ideas? Questions? E-mail me at cchristner@madisonpubliclibrary.org

Ashbrook, Peggy. *Science is simple: over 250 activities for preschoolers.* Gryphon House: Beltsville, MD, 2003.

Filled with concrete directions for easily do-able, yet fascinating and educational activities divided into 40 areas of study (magnets, melting, dirt, mirrors, etc.), this book is an amazing resource for librarians wanting to incorporate science into their programs. Each chapter also includes read-aloud recommendations. Highly recommended!

Gubnitskaia, Vera and Carol Smallwood, eds. *How to STEM: Science, Technology, Engineering and Math education in libraries.* Scarecrow Press: Latham, MD, 2013.

I contributed a chapter to this book about my early experiences with WonderWorks. The rest of the chapters give some great ideas for STEM programming for older kids.

Kohl, MaryAnn. *Science Arts: discovering art through science experiences.* Bellingham, WA: Bright Ring Publishing, 1993.

Add an "A" for Art and you get STEAM! This is a great way to pull art into your STEM projects. This author is renowned for her art books for children.

Moomaw, Sally. *More than Counting.* Red Leaf Press: St. Paul, MN, 2011.

Dr. Moomaw actually has a whole series of "More than...." books that give lots of hands-on, practical experiments or exercises that can be easily adapted for use in libraries.

Moomaw, Sally. *Teaching Mathematics in early childhood.* Paul H. Brookes: Baltimore, 2011.

Although this book is designed for classroom use, it provides excellent background for best practices for introducing mathematical concepts, many concrete activity suggestions, and also demonstrates the best ways to smoothly incorporate math ideas into our everyday conversations with children.

Moomaw, Sally. *Teaching STEM in the early years.* St. Paul, MN: Redleaf Press, 2013.

Includes some great hands-on project ideas and instructions. Aimed at early elementary students, but some of the projects could work for preschoolers.

Williams, Robert A. et al. *The Preschool Scientist.* Silver Spring, MD: Gryphon House, 2010.

An excellent collection of learning activities, easily translatable to activity stations in a library setting. Also includes suggested companion picture books. Highly recommended!

MathAtPlay.org (website/blog by Judy Ballweg of the Madison Metropolitan School District)

A rich resource of ideas and research about making math fun for young children. Although it is no longer being added to, the content that is archived there is still fantastic and free!

TeachPreschool.org (website/ blog) – Includes ideas for STEM in preschool

Where to buy STEM supplies & equipment:

www.stevespanglerscience.com

(Steve Spangler has tons of great experiment ideas, but many are geared for older kids)

www.fivedollarfunscience.com

Don't forget dollar stores, thrift stores and other discount sources!