FACILITATOR GUIDE
Early Explorations

Learning objectives for caregivers

- Exploring materials, using tools, and making observations are important skills for doing science.
- Very young children (ages 0–4) use science process skills (like exploring, categorizing, measuring, observing, predicting, problem-solving, and using tools) to learn about the world around them.
- Practicing science process skills early and often is important for children's brain development.

Materials

- Jumbo eyedroppers
- Spray bottles
- Sponges
- Aluminum foil
- Felt squares
- Toy brick baseplates
- Small plastic petri dishes
- Plastic trays
- Color-changing bath tablets to color water
- Waste/dump bucket
- Microfiber towels
- *Water Rolls, Water Rises: El agua rueda, el agua sube* by Pat Mora, illustrated by Meilo So
- Take-home caregiver bookmarks
- Activity and facilitator guides
- Information sheets
- *Tips for Leading Hands-on Activities*

Optional tools and materials: Anything else you have on hand to promote free exploration! This activity lends itself well to additions, substitutions, and subtractions of materials and tools. Watering can nozzle bottle cap attachments, dropper bottles (Nalgene brand single drop), modeling clay, rocks, and pebbles are some examples of effective additions. Try to offer materials of different textures, colors, and absorbency, and tools that fit small hands! **Avoid choking hazards.** Remember that even the most basic tools (rulers, magnifiers, etc.) may be new to very young children.

The Explore Science toolkit comes complete with all necessary materials for this activity. Materials are also readily available online or at local retail stores to create or restock activity kits. Graphic files can be downloaded from *www.nisenet.org.*

Safety

Kids may be tempted to put tools and small objects in their mouths. Follow your institution's protocols to sanitize materials as needed, and make sure that small pieces don't break off and become choking hazards. Monitor use of spray bottles to avoid children shooting water into their own or other people's eyes. Discourage any attempts to drink the water used in this activity.

Advance preparation

Before you begin:

- Cut aluminum foil into squares. These can be used multiple times.
- Cut felt into smaller squares. These can be used multiple times.
- Cut kitchen sponges in half, so that they fit into petri dishes.
- Add color-changing bath tablets to water.
- Fill dropper and spray bottles with colored water.
- Place surfaces (aluminum foil, felt, brick baseplates) onto plastic trays to reduce mess.

Notes to the presenter

This activity gives caregivers and their children an opportunity to practice scientific ways of thinking that are developmentally appropriate for early learners. In this case, we're doing so while getting a feel for some properties of water. But rather than emphasizing content, the activity highlights *science process skills:* in other words, what *doing science* can look and feel like at a young age. Try facilitating this activity on a low table or in a space designated for early learners to cue the intended audience.

Engaging adult caregivers

To get caregivers involved in the activity from the beginning, hand them a bookmark and point out the *science process skills* listed on one side. Use concise language to provide a clear role for adults:

> "This activity helps early learners develop the types of skills (listed here) that scientists use every day. I'm going to need your help working with [child's name]. Check out this bookmark for ideas to engage your child, and try them out throughout this exploration!"

Engaging early learners

As a facilitator, you should model best practices for caregivers to engage early learners in scientific thinking. You can invoke the following strategies throughout the activity.

Ask for comparisons between different materials to prompt *exploration, observation,* and *categorization.* If possible at the beginning of the session, place the water and water tools out of sight to encourage an initial focus on the other materials.

- Encourage children to use sight and touch to gather sensory input.
- Begin with open-ended questions like "How does [the felt] feel?" or "What do you notice about [the aluminum foil]?" If kids have trouble answering, offer examples of specific, descriptive language to help children compare and categorize the materials. For example: "Is the felt *soft* or *hard*?" Or: "Which is *shinier*, the felt or the aluminum foil?"
- Ideally, introduce water and hand out tools *after* participants have had a chance to explore the surfaces. Then, have participants use sight and touch to gather information about how the materials changed once water is added. "Does [the felt] feel/look different now? Did the color change? What do you think will happen if we spray water onto [the brick baseplate]?"
- Make sure to provide opportunities for kids who can't yet verbally articulate their thoughts to *show* you what they are thinking by pointing to or manipulating the materials in front of them. For example, if you ask, "Where do you think the water will go when I pour it on top of this mountain?," provide different options a child can point to.

Show participants how to use the tools (and invite other adults to join!)

- Show kids how to pull at the bottom of the spray bottle "trigger" for more leverage. Experiment with adjusting the nozzle to see what happens. Help children aim the spray.
- Demonstrate how to use the eyedroppers, and walk kids and adults through what you are doing. You can even try picking up water from the soaking-wet felt!
- Sponges can be used to absorb water that has been sprayed onto surfaces and into petri dishes. They can also be used to squeeze water back out onto surfaces.

Throughout the activity, "sportscast" (narrate) participants' experimentation processes.

- For example: "I see that you're pouring that water very carefully" or "You're squeezing the sponge to make it rain!"

Use your imagination. For example, you can make connections between the materials on the table and familiar landscape or water cycle components.

- Petri dishes become lakes or ponds, the aluminum foil is a mountain range, spray from the bottle is rain, etc.
- Involve the child and their adult(s) in storytelling about the scene that they are creating.

Ask open-ended, testable questions to further exploration, observation, categorization, and use of tools.

- Focus your questions on how the water behaves on different surfaces. For example: “What happens if you drop water on top of the [aluminum foil] mountain?” Then: “What do you think will happen if you drop water onto the felt? Where will the water go?”

Pose small challenges that can be addressed using the tools on the table. This is beginner problem-solving!

- For example: “What could you do to fill the [petri dish] pond with water?”
- Or: “Can you find a way to move the water from this [petri dish] pond to the top of the [aluminum foil] mountain?”

Encourage real-life connections to harness prior knowledge, make science feel accessible, and reinforce the message that *science process skills* can be practiced anytime, anywhere.

Talk about rain. Where does it come from? Where does it go? Does it disappear in the soil like it does in the sponge? Where does it pool up to make puddles, like in the petri dish or on the brick baseplate?

Additional considerations

Each child is learning at their own pace. Some kids might want to just repeat the same portion of the activity over and over again. This is okay! Repetition is the foundation of replicability, and no matter what, they are exploring the properties of water, becoming acquainted with the materials on the table, and practicing parts of the scientific process. Just keep asking questions and providing narration!

This activity can get messy. Have the towels and dump bucket on hand to wipe down surfaces between participants. Color tablets added to water are washable, so don’t worry if they get onto clothing or tabletops.

Optional extensions

You might choose to offer this activity as part of a story-time program. Read *Water Rolls, Water Rises: El agua rueda, el agua sube* by Pat Mora, illustrated by Meilo So, and then offer several extra sets of materials to allow multiple children and their adult(s) to experiment with the activity. In this format, you can put all surfaces and tools out on the tables to encourage free exploration. Give bookmarks to all adults. Circulate and model open-ended questioning, narration, etc.

For slightly older children, you may add obstacles (like rocks or blocks) to a surface (but remember to avoid choking hazards for younger kids). Challenge them to find interesting ways of moving the water around the obstacles. See what happens when they drop or spray water on top of a rock, rounded block, etc. You can also observe the displacement of water when you drop a rock into a petri dish.

Difficult concepts

Scientific inquiry looks different at different developmental stages, but the basic skills needed to engage with the scientific process don't change! Regardless of their own education or experience, all caregivers can encourage their children's use of science process skills.

Participants may be unaware that NASA studies more than just space. Due to its unique chemical properties, understanding water is a key factor in exploring life in the Universe. This type of research begins right here on Earth. In fact, NASA has more missions studying Earth than any other object in space.

Staff training resources

Refer to the *Tips for Interacting with Young Learners* sheet in your activity materials.

- Activity Training Video: *https://vimeo.com/366776611*
- Edu-cathalon Facilitation Strategies Video: *https://vimeo.com/304241578*

The NISE Network has a curated list of programs, media, and professional development resources that directly relate to the toolkit. These resources can be viewed and downloaded from: *www.nisenet.org/earthspacekitextensions*

Credits and rights

This activity was adapted from *Water Droplet Exploration,* developed by the Collaborative for Early Science Learning. Retrieved from: *www.sciencenter.org/resources-for-educator*s

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