Water Cycle in a Bag

LESSON SUMMARY

This outreach activity is designed to help students understand the water cycle through a hands-on activity that illustrates evaporation, condensation, and precipitation.

Length of Lesson
30 minutes (plus time for observation 1 hour - 3 days)

Materials
- Resealable plastic bags (1 per student, quart size work well)
- Permanent markers (washable markers will wash right off)
- Water (¼ cup per student)
- Blue food coloring (optional)
- Tape (clear works best, but it must be sticky enough to secure the bag to a window)
- Access to sunlight or a sunny window

Standards
Common Core
Mathematics:
CCSS.Math.Content.3.M D.A.2

NGSS
Earth's Systems: 2ESS2-3

OBJECTIVE

By the end of this lesson, students will have a basic understanding of the water cycle process and the interactions between the cycles.

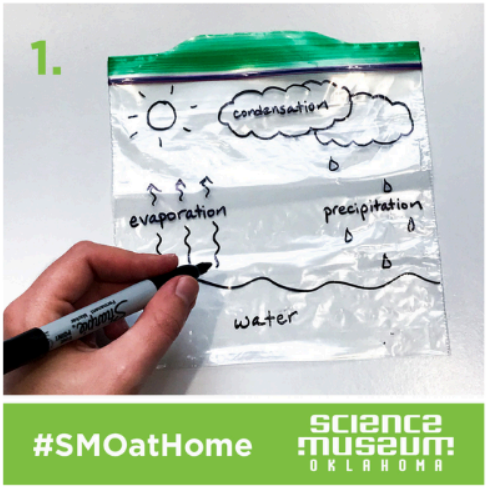
SUGGESTED SEQUENCE OF EVENTS

1. **Define a Cycle**
    a. Ask students to define a **cycle**. Ask them to name cycles in their lives (i.e. morning, afternoon, night; winter, spring, summer, and fall). Ask students to think of where their water comes from. Ask them if they have ever heard of the water cycle.
    b. Share the definition of the water cycle with students:
        i. **Water Cycle:** The water cycle is the path that all water follows as it moves around our planet.

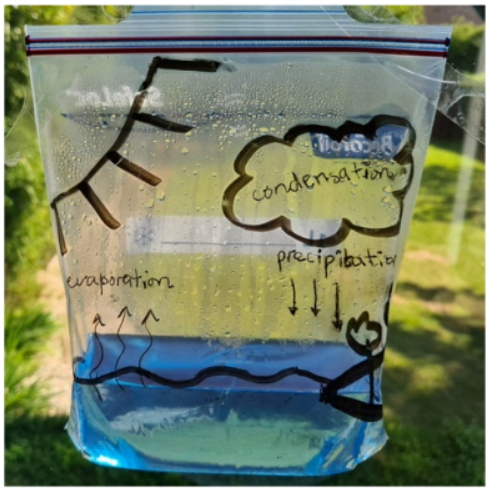
2. **Explain the Water Cycle**
    a. Ask questions such as, "Where do you think rain comes from?" or "What happens to puddles after it rains?"
    b. Explain the key processes involved in the weather cycle: evaporation, condensation, and precipitation.

i. **Water Cycle:** The water cycle is the path that all water follows as it moves around our planet.
ii. **Evaporation:** Heat from the Sun causes water to **evaporate** from oceans, lakes and streams. Evaporation occurs when liquid water on Earth's surface turns into water vapor in our atmosphere.
iii. **Condensation**: Warm water vapor rises up through Earth's atmosphere. As the water vapor rises higher and higher, the cool air of the atmosphere causes the water vapor to turn back into liquid water, creating clouds. This process is called **condensation**.
iv. **Precipitation:** When a cloud becomes full of liquid water, it falls from the sky as rain or snow—also known as **precipitation**. Rain and snow then fill lakes and streams, and the process starts all over again.

c. Draw on your ziplock bag as you explain each process. Be sure to include a **body of water, a cloud, the sun, and raindrops** in your picture. Arrows are also helpful to include. Your bag could look something like this:



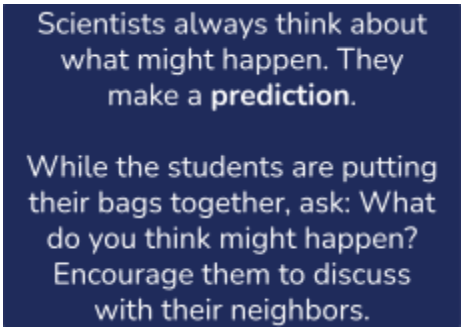
https://www.sciencemuseumok.org/smoathome/try-see-water-cycle-bag



https://www.montessorischoolofoceanside.com/water-cycle-in-a-bag/

- Make sure everyone has a chance to view the bag; it will serve as a model for the others.

3. **Create the Water Cycle Bag**
    - Hand out a Ziplock bag and permanent marker to each student.
    - Label the bags: Instruct students to use the marker to draw the sun, water, clouds, and raindrops on one side of the bag to represent the water cycle.
    - Fill the bags with about ¼ cup of water each, with a drop or two of blue food coloring to make it visually appealing.
        - As you are going around the room filling student bags, ask: "***With water pooled at the bottom of your bag, what step of the water cycle would this be?***"
    - Seal the bag; make sure it's nice and tight! You don't want any water to be able to escape.



4. **Hang the Bags**
    - Use clear tape to hang the bags to a sunny window. Position them so that sunlight can hit the bags directly.
5. **Observation**
    - **Within a few hours:** You should see a change in your bag between two hours and 1 day, depending on the amount of sun and the time of day you started.
        - Encourage students to make observations. Ask: What do you notice? Does there appear to be less water gathered at the bottom of the bag? What could cause this? Does it appear foggy in the bag? Do you detect any signs of condensation?
    - **Over the next few days:** Continue to observe the bags. Eventually, they should begin to see droplets of water sticking to the side of the bag. Some of these will be up high (in the clouds) while other droplets will be on their way back down (like rain). They should notice **evaporation** (water disappearing), **condensation** (water droplets forming on the bag), and eventually, some will even see water collecting at the bottom of the bag, simulating **precipitation**.
6. **Discussion and Reflection**
    - After a few days, bring the class back together to discuss their observations.
        - Ask questions like: "What did you see happening in your bag?" and "How does this relate to what we learned about the water cycle?"
    - Share an interpretation: The water in the bag is being heated up against the sunny window. That water turns into a gas through the process called

evaporation. In nature, evaporated water vapor goes into the atmosphere, but in our bag, it has nowhere to go, so it ends up sticking to the sides of the bag, turning back into a liquid as condensation. That condensed water then slides back into the pool of water below as "rain".

7. **Connect to Real Life**
    - Discuss how the water cycle affects their local environment and why it's important.

SOURCES & RESOURCES

- https://climatekids.nasa.gov/water-cycle/
- https://www.mobileedproductions.com/blog/how-to-make-a-water-cycle-in-a-bag
- https://www.sciencemuseumok.org/smoathome/try-see-water-cycle-bag
- https://www.waternsw.com.au/__data/assets/pdf_file/0008/217853/WaterDiscovery_WaterCycleInABag_IntroResults.pdf
- https://www.waternsw.com.au/education/teachers-and-students/student-learning-experiences
- https://beyondthebarndoor.wordpress.com/wp-content/uploads/2021/06/water-cycle-in-a-bag-1.pdf