

Water Cycle in a Bag

Summary

Subject(s)

ESS2.C: The Roles of Water in Earth's Surface Processes

Grade/Level

Grade 4

Activity Type

Develop a model to describe unobservable mechanisms

MN Science Standard

4E.1.1.1.2

SEP / CCC

SEP: Asking questions and defining problems

CCC: Energy and Matter

Est. Lesson Time

45 minutes

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Lesson Plan

Introduction

Seventy percent of the Earth's surface is covered in water, which is the same water that was present in the time of the dinosaurs. Our current water is usable by humans because of water's ability to move through the environment. The world's water moves between lakes, rivers, and oceans, then up into the atmosphere as vapor and back to the land as rain in an ongoing cycle called the Water Cycle.

Normally the Water Cycle takes place over a long period of time making it hard to observe by humans, This small model of the water cycle allows us to observe how heat evaporates water into the atmosphere, condensing into water droplets as clouds. Gravity then moves the water back down to the earth as rain. These three processes are called precipitation, evaporation, and condensation. This cycle helps provide water and to life across the earth.

Key Terms

- **Precipitation** - The effect of gravity forcing water to fall from the sky in the form of rain or snow.
- **Evaporation** - The effect of the Sun heating up water until it turns into a gas and rises into the atmosphere/sky.
- **Condensation** - The cooling of evaporated water causes it to turn into a snow-like solid hanging in the atmosphere in the form of clouds.
- **Drought** - Period of unusually little rainfall, leading to a shortage of water.
- **Flood** - An overflowing of a body of water covering regularly dry land in water.
- **Hydrologic (Water) cycle** - The water cycle is the continuous movement of water from the earth to the atmosphere and back again. This process is a result of the sun's heat energy and the pull of gravity on water in its various forms (solid, liquid, gas).

Objective

Understanding of how water moves through the Earth system .

Essential Questions

- What are the three main steps in the water cycle and what happens in each step?
The first step of the water cycle is evaporation. About 85% of the water vapor in the air comes from water that evaporated from the oceans.
- How and why does water change states as it travels through the water cycle?
- Why is the water cycle important?
It is how water continuously moves through the environment, making itself available to people, plants, and animals across the entire planet. Without the water cycle, water would sit on the earth's surface, collecting pollutants, with no way to filter, or move from place to place via the atmosphere.

- How does the water cycle help regulate the Earth's temperature?
As water evaporates, it absorbs energy and cools the environment. As water condenses, it warms the environment.

Materials & Resources

- Plastic Lunch Bag (1 quart size preferred)
- Sand or Soil, approx. 1 Cup
- Room Temp Water(250 mls)
- Food Coloring
- Heat Lamp, or Sunlight
- Permanent Marker
- Tape

Introduction

Consider having students learn this simple song to help remember the parts of the water cycle. Sung to the tune of *Oh My Darling, Clementine* - "Precipitation,Evaporation, Condensation on my mind. This is the awesome water cycle and it happens all the time"

[The Water Cycle Song](#)

Procedure

- Lay the Plastic Bag flat. Write the following vocabulary words on the same side of the plastic bag: Precipitation, Evaporation, Condensation. Write Precipitation on the left side of the bag. Write Evaporation on the right side of the bag. Write Condensation near the top (opening) of the bag.
- Draw pictures to accompany the vocabulary words. Draw arrows from precipitation -> evaporation -> condensation -> to represent the cycle.
- Put 1 cup of sand in the bag, preferably off to one side of the bag.
- Pour 250 mls of water into the bag. Add 3 drops of preferred food coloring color.
- Tape the filled bag vertically in either 1) a spot with direct sunlight [a window, outdoors] or 2) on the wall under the light of the heat lamp.
- The evaporation of water will take some time (1-3 hours). Once evaporation begins, we can start to observe the "invisible" processes of the water cycle. Continue observations until you can identify each of the 3 main processes in the water cycle.

Large Group Discussion (15 Minutes): The following questions are meant to help students visualize other ways the water cycle is present in their lives. The example answers provided are not meant to encompass all possible answers.

- What types of precipitation have you seen outside this experiment?
 - Snow, Rain, Mist
- What types of condensation have you seen outside this experiment?
 - Fog on windows/windshield
- What types of evaporation have you seen outside this experiment?
 - Mist rising off a lake/river
- What is the relationship between the water cycle and the 3 states of matter?
 - Water "starts" as a liquid on the Earth's surface. It is heated by the sun and evaporates as a gas into the atmosphere. When it reaches the clouds, the water cools, becoming a solid. Once it is

heavy enough, gravity pulls it back down to earth as a solid or liquid, where it rejoins the surface waters.

- E. How do you think the water cycle is related to drought?
 - a. More evaporation than precipitation.
- F. How do you think the water cycle is related to flooding?
 - a. More precipitation than evaporation
- G. What happens to water when it evaporates? Does it disappear?
 - a. Turns into a gas. We cannot see it, but no water is lost
- H. Brainstorm all the places water collects when it hits the earth.
 - a. Lakes, Rivers, Ponds, Seas, Oceans, Groundwater
- I. How can humans disrupt the water cycle?
 - a. Brainstorm the effects of a water cycle impacted by human activity.
- J. Why is it important to conserve water? How does conserving water help keep the water cycle in balance?

Wrap-up (5 Minutes): The Key Ideas from the lesson are:

- Water cycles through the environment changing between a solid, liquid, and gas.
- Precipitation is when water is pulled by gravity down to the earth from the atmosphere.
- Evaporation is when water is heated by the sun, turns into a gas, and rises into the atmosphere,
- Condensation is when water, as a gas, rising into the atmosphere cools down as it goes up, solidifying and becoming a cloud.
- Floods and drought are caused by an imbalance in the water cycle, either too much precipitation, or too much evaporation.

