Water Cycle

Students will learn about the water cycle by constructing a microcosm environment where they will witness and catalog the hydrologic cycle.

Grade Level
Elementary

Time Frame
45 minutes

Learning Objectives	Vocabulary	Science TEKS	Materials
Students will: • Construct a microcosm where they will witness the hydrologic cycle • Identify the stages of the hydrologic cycle • Develop an understanding of the complexity of the hydrologic cycle	*hydrologic cycle, groundwater, condensation, evaporation, precipitation*	1.7 (b) (c), 2.8 (c) 4.7 (b), (c) 5.5 (b),	• 1 large glass container with lid for each participant or group • gravel • potting soil • terrarium plants (e.g., English ivy, holly fern, Boston fern, maidenhair fern, asparagus fern)

Background
Water is a form of matter, so it cannot be created or destroyed under normal circumstances. As a result, the water you drink today may have been in the iceberg that crushed the hull of the Titanic. Before that, the water may have been drunk by a Tyrannosaurus rex. Hydrologic Cycle Water is an outstanding example of the cycling of materials. Some water is broken down and re-formed, but most of it simply changes its form and location through the hydrologic cycle. This cycling process was discovered by Edmund Halley (discoverer of Halley's Comet) in the late 1600s. Throughout this lesson students will gain that understanding of water being a renewable resource.

Characteristics of water cycle
The Latin roots of these words show us its meaning. "Hydro" means water. "Logia" means "science of," and "cycle" implies a never-ending circle. Simply stated, the hydrologic cycle is the endless process whereby water is circulated from the sea or land to the atmosphere and back again. Some water moves very quickly through this cycle. Some moves very slowly, even pausing for thousands of years in deep groundwater

reserves. The amount of water circulating through the hydrologic cycle remains constant, but its form changes from liquid to solid or gas and back.
This recycling process has kept a balanced and fairly constant quantity of fresh water available on earth for nearly 3.5 billion years. A glimpse at how water is distributed on the earth soon makes this a very comforting thought. Three-fourths of the earth's surface is covered with water. However, 97 percent of all of the earth's water is saltwater, while only a mere 3 percent is fresh water. Of this 3 percent, two-thirds of it is locked up as ice in glaciers and the polar ice caps. Hence, only 1 percent of the earth's water is in a usable form. Thank goodness for the hydrologic cycle!

Instructional Procedure (5 E)

Engage

1. Ask students if they believe there is more water now, or less water now than when dinosaurs roamed the earth.
    a. It's the same amount! Explain how water is always recycled
2. Ask participants why water forms on the outside of a glass containing ice or a cold liquid that is allowed to stand in a warm area for some time or why the can see their breath outside on a cold day but not when the air is warm. NOTE that both these things are the result of *condensation.*

Explore

Tell students they are now going to demonstrate the water cycle through the following experiment.
1. Cover the bottom of each glass container with a 1-inch layer of gravel for drainage.
2. Add a 3-inch layer of potting soil on top of the gravel.
3. Select several plants to put in your terrarium. Be sure to space them far enough apart that they will not crowd each other.
4. Make holes in potting soil deep enough to cover plant roots. Gently pat soil around the roots and base of the plant.
5. Water the plants lightly and put the cover on the container.
6. Put the terrarium in a sunny location and watch the hydrologic cycle in action!
7. Small amounts of water (1 to 2 teaspoons) may need to be added about every 6 weeks depending on the tightness of the jar cover.

Explain

1. Explain to students the process of the hydrologic cycle.
    a. Bring to their attention the water drops gathering at the top.
    b. How did it get there? When I applied water, it was only to the soil.
    c. Through the process of evaporation the liquid water turn into vapor (a gas) rising up to the top. Where it condenses and turns vapor into a liquid again (the water droplets).
    d. Have students watch the condensation and make their own observation.
        a. What happens to the condensation on the top?
        b. Does it stay there?

c. What is this an example of? (clouds)

2. Students will observe that the water droplets will begin to fall.
    a. Explain to them that this is an example of precipitation.
    b. List to them all the forms of precipitation. (rain, hail snow, sleet)
3. Emphasize the continuation of the water cycle
    a. Once there is precipitation where does that water go?
    b. Some students will notice it will sink back into the soil while others will say it will evaporate again.

Elaborate

1. Ask students if all precipitation evaporates.
2. Bring to their attention how some of the water sank into the soil. *this would be a great opportunity to talk about groundwater
3. Guide students to have a broader understanding of the hydrologic cycle. Where does water found a river find its way back into the hydrologic cycle.
4. Have students create a list as to where they can find water.

Evaluate

5. Have students make a poster, model or diorama of the water cycle and use it to demonstrate how the cycle works.
    a. Have them explore new areas where water can be found and have them describe how the water cycle takes place there. i.e. ocean, water found in our body, river, etc.

Useful websites

https://www3.epa.gov/climatechange/impacts/water.html
http://www-k12.atmos.washington.edu/k12/pilot/water_cycle/teacherpage.html

Videos

The Water Cycle http://tiny.cc/i8mmdy
The Dr. Binocs Show The Water Cycle http://tiny.cc/hcnmdy