Water Cycle in a Box
4th Grade

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1. References:

- "Water Affects the Weather" lesson plan from 4th grade curriculum guide

2. Benchmarks:

ES-2 & ES-3 (Benchmark D): Identify how water exists in the air in different forms. Investigate how water changes from one state to another.

3. Objectives:

Understand that water is found on Earth in many forms and places. The movement of water in the water cycle is very important in order for all living things to survive.

4. Materials:

- Desk Lamp
- Plastic Earth Simulator
- Small Petri dish
- Food Coloring
- Water

5. Initial Demonstration:

Show the students the plastic earth simulator and its different components. Explain that the lamp will be used to simulate the sun shining down on the Earth and heating up the surface. Pour a small amount of water into the simulator and place on the cover. Set this up in front of the class and position the lamp to shin directly onto the simulator. While the simulator heats up and begins the water cycle, ask the students what they predict will happen inside the simulator. This experiment will take some time before the water evaporates and begins to cycle, but it leads nicely into the different processes involved in the water cycle.

6. Target Observations:

- The sun, simulated by the lamp, causes the Earth's surface to heat up. Water breaks into small particles and floats up into the sky where the temperature is cooler. As the water condenses on the cover, the water will begin to fall back to Earth, simulating some form of precipitation.
- Water exists in many different states such as rain, hail, sleet, snow.

7. Target Model:

- The concept that water is involved in a very important cycle necessary for life on Earth and can be found in many different states.

8. Procedure:

As you read through the overhead "What is the Water Cycle" prepared from the weather journal, have the students enter and define the following terms in their science journals: *water cycle, evaporation, condensation, precipitation, run-off, and percolation*. Review the definitions of the vocabulary words with the class to ensure their understanding.

Explain to the students that water is constantly moving from oceans, lakes, and ponds into the air, as the water cycles from one form to another. Begin with a puddle of water after a thunderstorm. What happens to water? It eventually dries up and disappears because of the sun's energy heating up the air. Therefore, the hotter the day and the more wind, the faster the water will evaporate. To better understand evaporation, place a small amount of water into a Petri dish, along with a couple of drops of food coloring. Then place the dish on the overhead with the lamp on and allow the dish to heat up. When the water evaporates, the food coloring left behind represents the impurities left behind on Earth. Explain that because the impurities are left behind, the water vapor will come back to Earth as clean rain or snow.

By this time the initial demonstration should begin condensing on the cover. Hold up the simulator to the class so that they can see what exactly is taking place, while some students may ask to come see the water cycle up close. Remind the students that just as in the interactive demonstration of water droplets, the water vapor will float up into the sky. The temperature is cooler, so the water droplets collide with dust particles and condense to form clouds. Introduce the term, *dew point*, to the students and have them respond to the question in their weather journals about the dew point. Explain that dew and frost in the mornings are examples of water condensing near the Earth's surface. Following this lesson, have the students write two facts they learned about the water cycle in their science journals.

9. Target Observations:

- Water evaporates because of hot air, leaving impurities behind to make clean precipitation. Because of cooler temperatures in the sky, water droplets stick together with dust to form clouds. When the clouds can hold no more water vapor, precipitation is formed.

10. Target Model:

- Water exists in living things such as plants and animals, as well as bodies of water. This water had to get to those places through the forces of gravity and absorption. Water moves from these different places through the intense heat of the sun, and eventually moves into the clouds.