**Water Cycle**

**Lesson #1:** **Introduction to the Water Cycle**

**Time Frame:** 60 minutes

**Safety Warning:** This lesson includes the use of hot plates and heat lamps, which should not be handled by the students.

**Reminder:** Ice is not provided for this lesson.

**Learning Standards:**

*Science*

Earth and Space Science: The Water Cycle

1. Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere.

Physical Science: States of Matter

1. Describe how water can be changed from one state to another by adding or taking away heat.

Skills of Inquiry

* Ask questions and make predictions that can be tested.
* Keep accurate records while conducting simple investigations or experiments.
* Recognize simple patterns in data and use data to create a reasonable explanation for the results of an investigation or experiment.
* Record data and communicate findings to others using graphs, charts, maps, models, and oral and written reports.

**Student will be able to:**

1. Explain how water moves through the water cycle.
2. Form predictions about how the water cycle works, record observations, and develop conclusions about the water cycle.

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| Science notebooks |  |
| Plastic aquarium | 3 (in bin) |
| Potting Soil | 1 bag (in bin) |
| Small plastic container | 3 (in bin) |
| Water (not provided) | (in classroom) |
| Plastic toys | 1 bag (in bin) |
| Rocks from outside (not provided) |  |
| Saran wrap | 1 (in bin) |
| Masking tape | 1 (in bin) |
| Heat lamp (with light bulbs) | 1 (in bin) |
| Bag of ice (not provided) |  |
| Hot plate (provided only to Greylock, other schools can get a hot plate from the science supply room) | 1 (in bin) |
| Metal pan | 1 (in bin) |
| Ice cubes (not provided) |  |
| Tongs | 1 (in bin) |
| Glass beaker | 1 (in bin) |
| Water cycle diagram student copies | 30 (in bin) |

**Vocabulary:** *Please go over these terms before starting the activity*

**Evaporation:** water changes from a liquid to a gas; occurs more rapidly at warmer temperatures

**Atmosphere:** the gases the surround the earth

**Condensation:** water changes from a gas to a liquid; occurs when water vapor gets cold

**Precipitation:** water falling to the earth in the form of rain, hail, mist, sleet, or snow

**Collection:** water that falls as precipitation comes together in bodies of water such as oceans, rivers, lakes, and streams, or underground

**Focus Activity:** Ask the students to answer the following prompt in their science notebooks: Name things in nature that is made of water. Ask students to volunteer answers in order to compile a class list. The list may include oceans, rivers, streams, ponds, lakes, clouds, underground water, and water used and disposed of by humans.

**Introduction:** Tell the students that water moves from location to location. Ask the students to think about how the ground becomes wet after it rains. Where does that water come from, and where does it go? Explain that water from the clouds drops on the ground and then gets taken in (absorbed) by the ground. This is part of something called the water cycle. Feel free to use hand gestures, movement, or song when introducing the stages of the water cycle, as a memory aid.

**Activity:**

1. Place a large glass or plastic aquarium in front of the room. Ask for student volunteers to help you arrange the soil in the containers to make mountains, hills, and a lake basin. Fill the plastic container with water, and put it in the area designated as the lake basin. Surround the cup with soil. Plastic trees, sticks, leaves, rocks, etc., can be included to make the model more interesting. Cover the entire container tightly with plastic wrap and tape down the edges.
2. Evaporation and condensation should occur naturally but can be sped up by placing a bag of ice outside of the aquarium at one end and a heat lamp at the other end.
3. Ask students to make predictions about what will happen inside of the container. Students should write or make a drawing of their predictions in their science notebooks. It may help to review the idea of water changing from one state of matter to another during evaporation and condensation.
4. While students are waiting for evaporation and condensation to occur in the aquarium, present another model of the water cycle. Boil some water in a glass beaker on a hot plate. Ask the students to observe what happens to the water. What makes the water evaporate or boil?

*Teacher Explanation: When the water boils, it evaporates and becomes steam. Steam is the gaseous form of water, which has more heat energy than liquid water. Gas is less dense than liquid, so it rises.*

1. Hold a metal pan with ice cubes above the boiling water and ask students to watch what happens to the bottom of the pan. Why do water droplets collect on the bottom of the pan? Why does the steam turn back into a liquid on the metal plate?

*Teacher Explanation: Ice is the solid form of water, and it has a low level of heat energy, so it cools down the pan. When steam hits the pan, it cools down and loses heat energy, and it becomes a liquid in the form of water droplets. The process by which steam cools to become water is called condensation.*

1. When the water starts to fall off the pan and back down into the beaker, explain that this is called precipitation. As time permits, draw a diagram of this model on the board and label the key parts and processes.
2. Watch for condensation on the top of the container and have students observe precipitation as the water falls to the ground. Ask the students to think about where the water from the sky is coming from. Review evaporation. Compare the results of this experiment with the student predictions.
3. Ask all of the students to make a drawing of the experiment with arrows showing the flow of the water in this set-up. For a more advanced diagram, students can label where evaporation, condensation, and precipitation occur in the experiment. Students should also write a few sentences describing how this model demonstrates how water moves on earth’s surface and atmosphere. Use the color copies or overhead of the water cycle to discuss the water cycle in detail.

**Closure:** Discuss the following questions as a class: Does water in the ground end up in the atmosphere again? How? How does water change states in the water cycle?

**Assessment:** Science notebook responses, predictions, participation in class discussions

