The Water Cycle
5th Grade
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**Benchmarks:**

SLC 13: Demonstrate an understanding of the cycling of resources on Earth, such as carbon, nitrogen and/or water
SLC 3: Identify inferences that explain or help interpret their observation

**Objectives:**

Students will understand the major components of the water cycle, including evaporation, condensation, and precipitation. They will progress beyond a picture based cycling model to an abstract depiction using only words and arrows.

**Materials:**

- Water Cycle Model Kit w/ lamps, ice
- Plastic cups and Styrofoam plates (1 each per group of 4), food coloring
- Hot plate, sauce pan, glass bowl, ice
- Magnetic water cycle cut outs

**Initial Demonstration:**

Two days prior to the “official” start of the lesson, ask students to make observations in their science journals of a water cycle kit that will be placed in a conspicuous spot in the classroom. Give no information about water cycles, but allow students to watch how the kit is set up.

**Target Observations:**

- Students observe that after a short time “rain” begins to fall from the cloud onto the mountains, and then rolls down the slope into the sea.
- The sea never rises.

**Target Model:**

- Rain falls from clouds and runs into the sea.

**Procedure:**

Put students into groups of four and give each group a plastic cup and Styrofoam plate. Ask the students to make observations in their science journal about their cup. Then, fill the
cups with colored ice water. Have students continue making observations of the outside of their cup over the next three to four minutes.

Once observations are complete, discuss their theories regarding how the outside of their cup came to have water on it. To help guide them away from the idea that the water may come from inside the cup, you might ask whether the color of the water outside the cup is the same as the water inside the cup. Students may also be reminded that they see this phenomenon with cold pop cans in the summer. (Does the can sweat pop?) The discussion should include the reason the droplets form (the cup is cold). Introduce the word condensation.

**Target Observations:**

- Water formed on the outside of the cup.
- The water was a different color than the water inside the cup.

**Target Revised Model:**

- The water on the outside of the cup came from the air and condensed because the cup was cold.

**Procedure:**

What happens to the water now? Lead students into a discussion of evaporation. Ask students why we don’t see droplets rise up from bodies of water and sit in the air around us. (Water evaporates as a gas.) Next, introduce the question of how one might speed up the process of evaporation; have the students brainstorm different theories. To test their ideas, each group should pick a different spot in the room to place their cup of water. After a proper system is devised to ensure each cup is identical (i.e. all variables are controlled other than the placement of the cup), have the students put their cups in their chosen spot and mark the progress of evaporation throughout the remainder of that day and the next (if necessary).

**Target Observations:**

- The water on the outside of the cup disappears (evaporates).
- Some of the cups had their water evaporate faster than others.

**Target Revised Model:**

- Sunlight helps water evaporate into the air.
- From there, it is condensed into clouds.

**Procedure:**

Beginning with a discussion of their observations of the water cycle kit, connect the condensation/evaporation activities with what the students have been watching happen in the kit. If students need reinforcement regarding the link between evaporation and condensation, a new
 experiment may be done. For this demonstration, use a hot plate to heat water in a sauce pan (“the sea”) to near boiling. Above the pan, have a student hold a bowl of ice water (“the cloud”). Students will observe steam rise up, condense on the bottom of the bowl, and then “rain” down. Introduce the word precipitation.

To expand on these ideas, more leading questions can be asked:
1. What other types of precipitation do we experience?
2. What conditions are necessary to create different types of precipitation?
3. Why doesn’t it rain every time there are clouds in the sky? (The droplets in the cloud aren’t heavy enough to fall out.)
4. Where does all the precipitation go? (soil, ground water, lakes, rivers, oceans)

Have students pull the lesson together by listing all the parts necessary to make the events in the water cycle kit happen.

**Target Observations:**
- Steam from the sauce pan water rises in the air to the bottom of the ice bowl.
- Water droplets appear on the bottom of the ice bowl.
- Some of these droplets falls back into the sauce pan.

**Target Revised Model:**
- Water evaporates from bodies of water, condenses into clouds, and rains down when the droplets in the clouds get too heavy. The cycle repeats.

**Procedure:**

Now we are ready to put the cycle together. Stick cutout pictures of the major elements of the water cycle in random fashion on the chalkboard. Ask students to draw a picture in their journals that puts all these elements together in a logical order. When they are finished, discuss their drawings and use their ideas to arrange the pictures on the board properly.

To move to an abstract depiction, first connect the pictures with arrows that follow the flow of water and then replace the pictures with words. Have students copy the abstract cycle from the chalkboard into their journals.
Target Observations:

- Water vapor from the air condenses into liquid water in the clouds.
- Water in the clouds falls as rain or snow to the ground (eventually into rivers, lakes, oceans, etc).
- Bodies of water experience evaporation where liquid water goes into the air in the form of vapor.

Target Revised Model:

- The water cycle involves liquid water in lakes, rivers, oceans, etc. evaporating into the air, condensing into clouds, precipitating back to the ground and bodies of water, and then repeating the cycle again.

Summary:

Students found that water evaporates with the aid of sunlight and becomes water vapor (a gas) in the air. This water vapor condenses into clouds because it is cold in the upper atmosphere. When the droplets in a cloud become too heavy, the cloud precipitates. This can take the form of rain, snow, sleet, hail, etc. Precipitation rains onto the ground and percolates through the soil, providing water for plants and adding to the water table. Precipitation also falls on streams, rivers, lakes and oceans. This combination of evaporation, condensation and precipitation forms a cycle that repeats continuously. The students have mastered the terms condensation, evaporation and precipitation. They know how to express this physical cycle in abstract terms. They are ready for carbon and nitrogen!