**Saturday Science Lesson Plan**

**February 13, 2010**

**A) Learning Objectives**

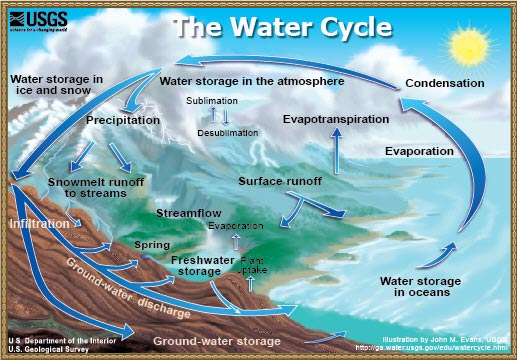
* Students will role play in group stations to follow the journey of a water molecule in 10 different stages.
* Students will write all of the steps of their journey as a water molecule in their journals.
* Students will perform a skit, story, or other creative method in front of the class to describe their journey as a water molecule.
* Students will describe the similarities and differences between groups’ water molecule journeys in a Venn diagram to compare their observations with those of other students.
* Students will draw at least 5 arrows (and write vocabulary words, if able) on a Water Cycle worksheet.

**B) Standards**

* **National Science Education Standards**
  + K-4 Science as Inquiry: Abilities necessary to do scientific inquiry
  + K-4 Science as Inquiry: Understanding about scientific inquiry
  + K-4 Earth and Space Science: Properties of earth materials
  + K-4 History and Nature of Science: Science as a human endeavor
* **Indiana State Academic Standards**
  + K.1.1 Raise questions and the natural world
  + K.1.2 Begin to demonstrate that everybody can do science
  + 1.1.2 Investigate and make observations to seek answers to questions about the world
  + 2.1.5 Demonstrate the ability to work with a team but still reach and communicate one’s own conclusions about findings
  + 2.1.3 Describe, both in writing and verbally, objects as accurately as possible and compare observations with those of other people
  + K.2.2 Draw pictures and write words to describe objects and experiences
  + 1.2.7 Write brief information descriptions of a real object, person, place, or event using information from observations
  + 2.2.5 Draw pictures and write brief descriptions that correctly portray key features of an object
  + K.3.2 Investigate things that move in different ways
  + 1.3.1 Recognize and explain that water can be a liquid or a solid and can go back and forth from one form to the other. Investigate by observing that if water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing
  + 1.3.2 Investigate by observing and then describe that water left in an open container disappears, but water in a closed container does not disappear
  + 1.3.3 Investigate by observing that the sun warms the land, air, and water
  + 1.5.2 Make and use simple picture graphs to tell about observations
  + K.6.1 Describe and object by saying how it is similar to or different from another object

**C) Content Knowledge**

* Water is a limited resource; all of the water that exists on Earth has existed since Earth’s formation. The process of water being consumed, precipitated, and recycled is called the Water Cycle.
* The Water Cycle is composed of several interspersed steps. Beginning on land, water is stored in the oceans. Through evaporation, it is changed to gas and rises as a vapor. As water vapor rises in the atmosphere, it becomes colder and changes back into a liquid through condensation. The liquid water drops condense onto tiny particles of dust, smoke, and salt to form a cloud. Water is stored in the atmosphere is clouds until several droplets combine in the cloud and large water drops are formed; through gravity, these large drops fall back to the Earth as precipitation (rain, snow, sleet). Precipitation flows back onto the land as runoff, where it reaches streams and lakes. Precipitation can also be stored as ice and snow, such as in a glacier. Some precipitation will land on plants and evaporate again, where it will cycle back up in the atmosphere. From lakes and streams, water will flow back towards to ocean and begin the water cycle again, or infiltrate into the ground and become groundwater. Water in snow and ice can melt to streams or infiltrate into the ground and become groundwater. As groundwater moves down-dip, it can discharge into streams and rivers or flow until it reaches the ocean, where the water cycle can begin again. Additional processes of sublimation (water changes from solid ice to gas) and evapotranspiration also occur in the water cycle.

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* Because water is a limited resource, contamination is a threat to the safety of drinking water. Pollutants, such as bacteria, petroleum additives, fecal matter, and trash contaminate human water supply and result in dangerous drinking conditions or expensive water treatment facilities.

**D) Materials**

* 27 mechanical pencils
* 6 packs of crayons
* 1 pack of construction paper
* 8 kid-friendly scissors
* Large chart paper
* 1 permanent marker
* 7 die pieces
* Dirt (1-2 buckets full)
* Saran wrap
* 8 ft. long string
* 5 clothes pins
* Blue food coloring
* Heat lamp
* Clear storage bin
* Handout of Water Cycle Score Card
* Handout of Water Cycle worksheet
* Simulation cards

**E) Lesson Description**

1. 9:30-9:40 Review of last week’s material, introduction of driving question chart. \*\*Students will be grouped by age/grade for this session.\*\*
2. 9:40-9:45 Introduction of water cycle demonstration
3. 9:45-10:05 Water role play activity (2 minutes at each station)
4. 10:05-10:15 Time for students to write down their water cycle journey in their journals
5. 10:15-10:25 Time for students to discuss & plan their water cycle performance
6. 10:25-10:45 Performance of water cycle skits/stories
7. 10:45-11:00 Snack & bathroom break
8. 11:00-11:05 Discussion on similarities/differences in their water cycle journeys
9. 11:05-11:25 Lesson on water cycle
10. 11:25-11:35 Demonstration of water cycle, put new vocabulary on word bank
11. 11:35-11:45 Complete water cycle worksheet
12. 11:45-12:00 Discussion of how the water cycle relates to water safety, complete the driving question chart
13. 5-E Learning Cycle
    * **Engage** Instructors will ask the students “What do you remember about last week’s lesson?” to gauge cognition of water safety. The Water Safety chart will be introduced (see below for schematic design) and we will begin to discuss attention-focusing questions such as “What do you know about the water cycle?,” “Have you ever seen the water cycle in action?,” and “Where does water come from?” Instructors will introduce the demonstration, contained in the large plastic bin, and tell the students that it represents the water cycle (this demonstration will occur later in the lesson.) Student’s initial descriptions about the water cycle will be written on the board. The water role play activity will be introduced as a way to follow the ‘journey’ of a water droplet. Instructors will model how the role play activity works in a cooperative manner.

**Is Our Water Safe?**

* + **Explore** Students will explore the Water Cycle through a role play activity. In groups of 4-5, students will take on the role of a water droplet and follow the journey of that droplet from various stations. At each station, students will write down their station on the Water Cycle Score Card, roll the dice, read the statement that corresponds to the number on the die, and then write down what happens to them and their destination. The instructor will call out “cycle” and students will go to the next station as was directed on the statement. Students will move throughout each of the 7 stations, exploring what happens to a water molecule in a cloud, glacier, ocean, stream, groundwater, animal, and plant, until each group has been to 10 total stations. \*\*Instructors and volunteers will be available at the stations to help answer student questions and to help write/draw student’s steps on their Water Cycle score card.\*\* Next, students will write their journeys in their journals and perform group skits; these evaluation activities are explained in the “Evaluate” section below.
  + **Explain** Instructors will discuss with students the similarities and differences between each groups’ water cycle journey. Instructors will ask several comparison questions, such as “How many times did you go to the cloud station,” “How are your water journeys alike?,” and “How do your water journeys differ?” Student ideas will be listed on the board using a Venn diagram. Next, Instructors will lead a Powerpoint presentation about the Water Cycle. Interactive flash games will be incorporated into the lesson and vocabulary words will be introduced.
  + **Elaborate** Instructors will demonstrate the water cycle; In a large bin, dirt will be formed into a slope to represent the land, and blue-colored water will fill a basin to represent the ocean. The bin will be wrapped with saran wrap to represent the atmosphere and a heat lamp will be placed at an angle to the bin to represent the sun. The bin will sit in the lamp during the morning portion of the session. After the Water Cycle lesson, Instructors will ask action questions about the demonstration, such as “What happened when the heat lamp was left on the water?,” “What happened to the water in the ocean?”,” and “How do you think water got onto the saran wrap?” Using the demonstration, instructors will elaborate on the vocabulary words introduced in the lesson earlier. Students will point to where each vocabulary word happened (for example, a student could point to the water droplets on the saran wrap as an example of condensation). Vocabulary words will be listed and drawn onto the class Word Bank.
  + **Evaluate** After students have rotated throughout the stations (as described in the Explore section), they will individually reflect on their experience and write down a brief story of their journey as a water molecule as they traveled through the water cycle. Next, students will re-join with their groups and form a group plan on how they will present their water droplet journey to the class (in a skit, as a story, etc.). Students can create props with construction paper and scissors, if needed. After planning, each group will perform their water droplet journey to the class. Later in the session (after the lesson and demonstration), students will be given a worksheet of a landscape and asked to fill in the Water Cycle arrows; if they are able, students should also write down the word associated with that arrow. Instructors will use these three formative assessments to evaluate student understanding of the Water Cycle.

**F) References**

1 http://ga.water.usgs.gov/edu/watercycle.html