Water Cycle Game

http://www.nps.gov/archive/wica/Hydrology/PDF/Hydrology-Water_Cycle_Game.pdf

Focus on Inquiry

The student will collect and analyze data while simulating water molecules moving through the water cycle.

Lesson Overview

In this activity, students identify the distribution of water on Earth and simulate how this water continuously moves in the hydrologic cycle.

Duration	Setting	Grouping	PTI Inquiry Subskills
50 minutes	Classroom	Cooperative groups	3.7, 5.2, 5.4, 5.8, 5.9, 7.2, 7.3

Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
Engage	10 min	5.4, 5.8	Internet printouts	2	Students are engaged in a discussion about the importance of water. Teacher demonstration on distribution of water.
Explore	25 min	3.7, 5.2, 5.8	Internet printouts	3	Students discuss the hydrologic cycle and participate in a water cycle game.
Explain	5 min	7.3	None	2	Students share their simulation data.
Expand	10 min	5.4, 5.9, 7.2	Internet/TV hook-up	3	Students view a video of the water cycle and compare and contrast the video to what was experienced in the simulation.
Evaluate	Varies	None	N/A	N/A	Student journals and class discussions can be used as assessment.

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

National Science Education Standards – Inquiry

Use appropriate tools and techniques to gather, analyze, and interpret data.
Develop descriptions, explanations, predictions, and models using evidence.
Communicate scientific procedures and explanations.

National Science Education Standards – Earth Science

Water, which covers the majority of earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.

Louisiana Grade Level Expectations – Inquiry

Gr. 8, Inquiry GLE#7 - Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)
Gr. 8, Inquiry GLE#12 - Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
Gr. 8, Inquiry GLE#14 - Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)
Gr. 8, Inquiry GLE#15 - Identify and explain the limitations of models used to represent the natural world (SI-M-A5)
Gr. 8, Inquiry GLE#19 - Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
Gr. 8, Inquiry GLE#22 - Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)

Louisiana Grade Level Expectations Earth Science

Gr. 8, GLE#23 - Explain the processes of evaporation, condensation, precipitation, infiltration, transpiration, and sublimation as they relate to the water cycle (ESS-M-A10)

Materials List

Engage Activity (teacher demonstration)

- Ice cube tray
- Mixing bowl
- Measuring cup
- Measuring spoons
- Salt
- Empty 2-liter plastic pop bottle

Explore Activity

- 1 set of water cycle dice (one die for each station)
- Laminated labels for each of the 10 stations
- Copies of the water cycle table (one for each station)
- Bell, whistle, buzzer, or other sound maker
- Journal or paper and pencil (one for each station or each student)

Advance Preparation

1. Obtain materials for teacher demonstration of distribution of water on Earth (Engagement Activity).
2. Print out the global water distribution pie graph (Engagement Activity) from http://www.nexuslearning.net/books/Holt_Env_Science/11-1.pdf.
3. Obtain materials for water cycle game (Exploration Activity). Make the dice for the game. Each of the 10 stations require a paper dice to be made and labeled based on the requirements of the stations (see details in the lesson PDF file)
4. Teacher needs to print labels for the 10 stations of the water cycle game prior to activity. The labels for each station can be laminated for future use.
5. Set-up stations for Exploration Activity.

Other Information

Objectives

The learner will:

- identify the distribution of water on earth.
- simulate water molecules moving through the water cycle.
- describe the movement of water within the water cycle.
- identify several different states of water as it moves through the water cycle.

Prior Knowledge Needed by the Students

- None

Procedure

Engage

1. Engage students in a discussion about the importance of water. Then ask them where all of Earth's water can be found. List all student responses on the board.
2. Teacher demonstrates the distribution of water on earth by completing "Limited Water Supply Activity" on website http://www.dmww.com/EducationWaterActivities/activity11.pdf.
3. Show students a pie graph of water distribution on earth. A global water distribution pie graph can be found on as Figure 2 (Page 270) of the following PDF file: http://www.nexuslearning.net/books/Holt_Env_Science/11-1.pdf
4. Ask the students if they think it is important to conserve water. Have them explain their answers.

Explore

1. Explain to students that they are going to simulate water molecules moving through the water cycle.

2. Students should begin the activity by rolling die to indicate their movement throughout the water cycle. They should record each role of the dice in their science journal. The complete instructions for this Exploration Activity can be found on the activity website: **The Water Cycle Game Project Wet Homepage:** http://www.nps.gov/archive/wica/Hydrology/PDF/Hydrology-Water_Cycle_Game.pdf.

Explain

1. Students share their simulation experience by reading their journals to the class.

Expand

1. A video clip explaining the water cycle can be found at http://www.epa.gov/safewater/kids/flash/flash_watercycle.html
   Teacher can either click the auto button to show the water cycle in motion or click on one of the four menu items.
2. Have students compare and contrast this video clip to what they learned as they simulated the movement of water through the water cycle in the water cycle game.
3. Have students recognize the limitations of both models (video clip and water cycle game).
4. Students can also engage in a discussion about how they think global warming is affecting the water cycle.

Evaluate

1. Teacher can use class discussion of the answers to the questions in the explain section as an informal assessment of student knowledge, as well as the student data gathered and student journals completed.

Blackline Master

1. none.

Supplementary Resources

Water, Water, Everywhere

http://www.quia.com/mc/65618.html

On this website, teachers can customize a computer matching game for students to identify facts about the water cycle.

Droplet and the Water Cycle

http://kids.earth.nasa.gov/droplet.html

This website contains an educational computer game for students to learn about the hydrological cycle.