

Teaching Environmental Sciences
Dr. Alan Sowards
Stephen F. Austin State University
Summer — 2007

Title: Water, Water Everywhere
Author: Mary Hurlburt
Grade Level: 4th Grade
TEKS: 112.6 Science. Grade 4, (a), (1), (2), (3), (5), (6), (b), (2), (A), (B), (C), (D), (3), (E), (5), (B)

Purpose: Helping students understand the cycle of water by showing where water comes from, why it is important in our daily lives and what we can do to help keep it clean.

Objective: Understand how the water gets to the water fountain and where it goes when it empties into the drain.
Understand the water cycle
Understand why water is important and how it gets polluted
Experiment with techniques for cleaning polluted water

Vocabulary:

Alum Powder	Charcoal	Water Tank
Sedimentation	Filtration	
Gravel	Reservoir	
Waste water	Water Treatment Plant	
Chlorine	Piping (Infrastructure)	

Background:

Many students stand at the water fountain pressing the lever without ever thinking of what happens to the water that goes down the drain. Most communities have water treatment facilities that follow strict guidelines to insure we have the water we need for daily use. Discuss with students where they think the water goes and how it gets to the water fountain. Discuss the previous lessons on the water cycle. Discuss the ways water is cleaned at a water treatment facility and how we could investigate a way to clean and filter water.

Materials:

<u>Containers</u>	<u>Pond Water</u>	<u>Water Filtering Materials</u>
4 - 2 Quarters Containers		Sand
1 - Measuring cup	2 Quarts	Gravel
3 - Mesh strainers		Activated Charcoal
		Fish Tank Filter Square

Investigation:

As a group, discuss the steps in the water cycle. Ask students to complete a drawing of the water cycle at the top of the Water Investigation Worksheet. The following investigation will demonstrate how dirty water can become clean drinking water.

1. Set up the 5 — 2 quart containers in a row with lids removed.
2. Place one teaspoon of Alum Powder in container 2.
3. Place strainers in container 3, 4 and 5.
4. Fill strainer in container 3 with sand.
5. Fill strainer in container 4 with gravel.
6. Fill strainer in container 5 with Activated Charcoal and place Fish Tank filter over the top.
7. Ask students to observe the container filled with pond water. Discuss with them: What color is the water? Why? Can students see through the water? Could plants live in this water? Would you drink this water?
8. Ask students to smell the water. Discuss with them: What can you smell? Why?
9. Ask students to work in groups of 4 to 5 and begin the investigation, pour 8 cups of the pond water into container 2 and watch the reaction of the Alum Powder with water. What do you see? What is happening to the particles in the water?
10. After the particles have settled to the bottom, pour 4 cups of water into the measuring cup.
11. Pour the 4 cups over the sand filter.
12. Remove the filter and pour the sand filtered water through the gravel filter.
13. Remove the filter and pour the gravel filtered water over the fish tank filter and activated charcoal.
14. Place the pond water container next to the last container filtered and observe the two containers side by side. Discuss with them: What do you see? Is the water cleaner? Why? What would happen if one of the steps were removed?

Assessment:

Part I: Students will use arrows and draw a picture of the water cycle.

Part II: Students will answer the following questions:

1. What happened when the pond water was poured over the filters?
2. Which step do you think cleaned the water the most? Why?
3. Why did the water change color?
4. Does the water smell different after it has been filtered? Why?
5. List two things you have learned about water filtration.

References:

- <http://www.sitesalive.com/itg/oliprivate/oltgCycle.htm>
- http://www.mayfieldews.com/iwater_treatment_process.htm
- http://www.mayfieldews.com/water_and_wastewater_terminology.htm
- http://www.epa.gov/region07/kids/drink_b.htm
- <http://encarta.msn.com/dictionary/Waste%20Water.html>

Extended Activity:

- Have students visit your local water treatment facility. Ask student to develop a water cycle beginning with rain drops and including the school water fountain. Work with students to build a model of water beginning with clouds turning to rain drops, to reservoir (lake), to water treatment plant, to school. Display in the hallway near the water fountain for students to enquire and discuss.
- Ask students to keep a daily log of home and school water usage for one week. Did you try to conserve? Did you recycle any of the products you used or consumed over the week?
- Ask students to come up with as many ways to recycle as possible and display them in the classroom.
- Ask students to test the pond water prior to completing the filter test. Then have students test water that was filtered to see what it contains. What are the changes that occurred?

Vocabulary Definitions:

Alum Powder — is colorless solid that turns white when it hits air. It is used to color clothing, water purification and curing leather.

Charcoal — a black or dark gray form of carbon, produced by heating wood or another organic substance in an enclosed space without air, used as fuel, absorbent, in filters, in smelting, and for drawing.

Chlorine — a gaseous poisonous corrosive greenish yellow element of the halogen group that is highly reactive and is a product of the electrolysis of sodium chloride which is used for water purification, disinfectant.

Filtration — the process of straining out something: the process of passing or putting something through a filter

Gravel — small crushed rock or stone.

Piping (Infrastructure) — public services or systems: the large-scale public systems, services, and facilities of a country or region that are necessary for economic activity, including power and water supplies, public transportation, telecommunications, roads, and schools

Reservoir — a lake or tank for storing water: a large tank or natural or artificial lake used for

collecting and storing water for human consumption or agricultural use

Sedimentation — the process by which particles are suspended in liquid form

Water Tank — a place to store a large quantity of water

Water Treatment Plant — a facility to clean and treat water before it is used by the public

Wastewater — water that is used and returns to the water treatment plant for cleaning before it can be used again

Water Investigation

Name: _____

Part I: Draw the water cycle. Use arrows to show how the water moves in the cycle:



Part II: Record your observations about the investigation.

- 1. What happened when the pond water was poured over the filters?**
- 2. Which step do you think cleaned the water the most? Why?**
- 3. Why did the water change color?**
- 4. Does the water smell different after it has been filtered? Why?**
- 5. List two things you have learned about water filtration.**