Teacher's Guide for

Implementation of Task

Prior Knowledge Required of Student:

- An understanding of matter, the states of matter, molecular movement in each state, and defining characteristics.
- How to read thermometers and measure liquids.
- Reading and writing skills.

Time Allotment: 10 days, 42-45 minutes/day

Student Groupings: During inquiry investigations and most of the unit, students will work in cooperative groups of four. Students will take part in Go to the Head of the Cloud activity independently, although more than 1 student may be at the same station from time to time. Students requiring reading assistance may be paired with a reading buddy. Group "jobs" will be based on student abilities (e.g., the PI will be a leader & strong reader).

Materials/Resources Needed: Supplies are per group of 4 students. For a class size of 25 students, multiply quantities by 6.

<table>
<tr>
<td colspan="2">Activity 1 Melting, solid to liquid, movement
1 Clear plastic cup
1 lamp
1 Cup Ice cubes
1 Plastic cup, shaped different from the other cup</td>
<td colspan="2">Activity 2 Freezing, liquid to solid, movement
Melted ice (water) from Activity 1
Access to a freezer
1 thermometer</td>
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<tr>
<td colspan="2">Activity 3 Expansion, movement of solids and liquids
1-2 Ice cubes
1 rectangular container (large foil baking pan)
1 lamp
Safety goggles
Water (2 C of cold or warm water depending upon student ideas for their experiment)
1 sandwich baggie
1 hammer
Blocks of varying height
Play dough
Card stock/ construction paper (paper fan)</td>
<td colspan="2">Activity 4 Evaporation: liquid to gas, Boiling Water
1 200 mL glass beaker
1 permanent marker
1 ruler
1 set of hot pads
1 hot plate
Water (approx 100 mL)
1 Adult assistant
1 Thermometer</td>
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Activity 5 Evaporation: Paintbrushes, puddles, and bowls 4 paint brushes 1 Bucket of water 4 pencils Watch 1 piece sidewalk chalk Plastic 2 cup measuring cup 4 Clipboards 2 Paper bowls	**Activity 6** Expansion Evaporation Moisture Wicking Sportswear 1 permanent marker Hot tap water 4 zip-closing plastic bags, quart size 2 brown paper towels Small cup Room temperature water 2 droppers 2 pieces of 3"x3" cotton fabric swatches
Activity 7 Condensation, gas to liquid, Condensation: Sweating Glass Room temperature water (approx. 3 Cups) 2 white paper towels 3 clear plastic cups Apron Ice cubes (approx 2 Cups) Food coloring 1 pair of plastic gloves	**Activity 8** Making "Rain" 1 empty glass jar 1 ruler 2 pitchers to transport water and ice hot water (enough to fill jar about 2 inches) 1 large dinner plate 1 permanent marker 2 cups of ice cubes
Activity 9 2 Disposable roasting pans (16"L x 12"W x 4"D) 6" x 8" piece of freezer paper Sod (sized to fit the pan) 1 Ruler 2 Watering cans 2 wooden boards (24" L x 2" thick) Stop watch 1 pair heavy duty scissors Wide packing/masking tape Soil, enough to cover pan 2 " deep 2 quart jars or clear pitchers Water Measuring cup	**Activity 10** 2 L plastic bottle Potting soil (approx 2 Cups) 1 Small plant and moss 1 Ruler Small watering can or cup Newspaper Small plastic cup (shot glass size) Gravel (approx 1 Cup of 1.25 cm) Tape Water 1 Permanent marker
The Returning Raindrop (terrarium)	

Teacher Preparation Prior to Unit:

- Decide how students will be grouped for all activities and how groups will be formed.
- Make ice.
- Review notes for phase changes, the water cycle, and water distribution.
- Prepare and send a letter to go home with students asking parents for terrarium donations, and adult volunteers to operate the hotplates during the evaporation lesson.
- Precut 2 L bottles for the terrariums.
- Prepare a bulletin board that will showcase the components of the water cycle as the students investigate them. Also, provide space for website connections for students to refer to and a concept word wall.

- Prepare and set up the game "Go to the Head of the Cloud". Directions and cut outs are included with this unit.

Implementation of Specific Activities:

Demonstration "How Wet Is Our Planet?"

Globe or large map of the world	5 gal. clear plastic container (or aquarium)
3 clear containers labeled "freshwater", "groundwater", "rivers & lakes"	Tablespoon
Eye dropper	Blue food coloring (a few drops)

The following icon is used to remind students that their written work will be scored for Language Usage. Students can be directed to look at the icon on page 1 of their Student Resource Booklet before they begin writing their response.

Language Usage Icon:

	**Language Usage** Whenever you see this picture, it is important to make sure that what you have written is clear and complete and that you have used correct spelling, grammar, punctuation, and capitalization.

Websites for Teacher Background Information:

The Water Cycle. Retrieved from http://www.sciencenetlinks.com/lessons.php?DocID=393

What is groundwater? Retrieved from http://www.groundwater.org/kc/whatis.html

Where is Earth's water located? Retrieved from http://ga.water.usgs.gov/edu/earthwherewater.html

How much water is there on, in, and above the Earth? Retrieved from

http://ga.water.usgs.gov/edu/earthhowmuch.html

How wet it our planet? Retrieved from http://www.groundwater.org/kc/activity6.html

http://www.nasa.gov/worldbook/wbkids/index.html

Trade Books:

Day, T. (2007). *Water*. New York, NY. DK Publishing.

Fowler, A. (1997). Icebergs, ice caps, and glaciers. New York: Children's Press.

Frost, H. (2000). *The water cycle.* Mankato, MN: Pebble Books.

Gallant, R. A. (1999). *Glaciers*. Canada. Grolier Publishing.

Hooper, M. (1998). *The drop in my drink: The story of water on our planet*. New York, NY: Penguin Group.

McKinney, B.S. (1998). *A drop around the world*. Nevada City, CA: Dawn Publications.

Nadeau, I. (2003). *Water in plants and animals*. New York, NY: The Rosen Publishing Group, Inc.

Relf, P. & Cole, J. (1996). *The magic school bus: Wet all over: A book about the water cycle*. New York, NY: Scholastic Inc.

Simon, S. (1987). Icebergs and glaciers. New York, NY: Mulberry Books.

Waldman, N. (2003). *The snowflake: A water cycle story*. Minneapolis, MN: Millbrook Press.

Woodward, J. (2009). *Eyewitness water*. New York, NY: DK Publishing.

Trade books from other websites:

Bodies of water: Fun, facts and activities (Easy-Read Geography) by Caroline Arnold

Eye Wonder: Ocean by Sue Thornton and Mary Ling

Salamander Rain: A Lake & Pond Journal (Sharing Nature with Children Book) by Kristin Joy Pratt-Serafini

Water Dance by Thomas Locker

The Water Cycle (First Step Nonfiction: Water) by Robin Nelson

The Incredible Water Show by Debra Frasier

Hydro's Adventure through the Water Cycle by Randi S. Goodrich, Michael S. Goodrich, and Michele Han

River of Words: Images and Poetry in Praise of Water by Pamela Michael

A Necklace of Raindrops and Other Stories by Joan Aiken

Down Comes the Rain by Franklyn M. Branley

I Love the Rain by Margaret Park Bridges

Student Connection Resources:

http://www.epa.gov/safewater/kids/flash/flash_watercycle.html site for kids about the water cycle

http://www.epa.gov/safewater/kids/waterfactsoflife.html site for kids, water facts

http://www.epa.gov/safewater/kids/behyrdological.html some for kids, would need to edit. Ideas to conserve.

http://acswebcontent.acs.org/scienceforkids/index.html#Evaporation site for kids to see condensation in nature.

http://ga.water.usgs.gov/edu/watercyclehi.html = USGS water cycle diagram.

http://www.epa.gov/safewater/kids/wsb/pdfs/The%20Water%20Sourcebooks%20-%20Fact%20Sheets.pdf This site is a reference site kids can go to find more information about the water cycle, possibly technology component for a unit assessment

http://www.epa.gov/safewater/watertreatmentplant/index.html for kids, virtual tour of a drinking water treatment plant

http://acswebcontent.acs.org/scienceforkids/index.html#Water for kids to see different locations of water, info is provided on each picture, and it tells how living organisms need water.

www.readwritethink.org kids can create a flip book

http://www.epa.gov/safewater/kids/kids_4-8.html for games and activities

http://www.nasa.gov/worldbook/wbkids/k_glacier.html info on glaciers

http://www.nasa.gov/worldbook/wbkids/index.html