

NTTI Media-Rich Lesson

Rita Bailey

NAME

What Goes Up!!

LESSON TITLE

FOURTH

GRADE LEVEL

60 MINUTE CLASS

TIME ALLOTMENT

OVERVIEW

Fresh water is a precious resource and should be conserved. During this lesson, students will explore where water is found as a **solid, liquid and gas**, investigate what happens to standing water and build a water cycle.

As water vapor cools into clouds, many things can happen to it, depending on the temperature. If the clouds stay relatively warm, the water vapor will collect into larger and larger drops until they are too heavy to stay aloft. **Rain** is one form of **precipitation**. Precipitation returns water from the atmosphere back to the surface of the Earth. If the clouds are cold enough, other forms of precipitation may occur. Water vapor may turn directly into **snow** in a process called **sublimation** (moving directly from a gas to a solid or a solid to a gas). **Hail** may be formed when raindrops are tossed high into the clouds and colder temperatures. As these small drops freeze, they are dropped lower into the clouds, coated with water, and then blown back up into the atmosphere to freeze again. When too heavy to be blown around in the clouds, hailstones drop to the Earth.

This lesson will give students the opportunity to explore the water cycle using, Internet websites, games, and standards based inquiry hands-on activities.

SUBJECT MATTER

Science and Technology

LEARNING OBJECTIVES

Students will be able to:

- Discuss where water is found as a solid, liquid, and gas.
- Compare and contrast an experimental water cycle model to the earth's water cycle.
- Examine the process of change as it relates to water in the atmosphere.
- Use technology to explore the water cycle components.
- Make Observations.
- Collect and record data.

STANDARDS

Georgia State Quality Core Curriculum - Science Standards for grade four

<http://www.glc>

Strand: Earth Science

S.4.28 Topic: Earth Processes: Weather and Climate

Demonstrates and describes the water cycle and the role of evaporation, precipitation and condensation. Examines the process of change as it relates to water in the atmosphere.

Strand: Inquiry

Topic: Inquiry, Process Skills, and Problem Solving

Asks questions, makes inferences and predictions, uses estimation and measurement, uses evidence to construct explanations, makes sketches and diagrams to explain ideas, organizes data into tables and charts for interpretation, reads and interprets various types of graphs, formulates simple hypotheses, identifies and controls a limited number of variables, and designs a simple experiment.

Georgia State -Quality Core Curriculum – Technology Standards for grade four

<http://www.glc>

Strand: Research

13 Topic: Research

Standard: Uses basic research techniques with teacher guidance.

Topic: Activities/Tools

Standard: Actively engages in the learning process via hands-on/minds-on science activities and experiences. Uses appropriate tools to collect and analyze data and solve problems.

MEDIA COMPONENTS

“Brain Pop” – Website: Matter Game/Movie www.brainpop.com

This site offers students an opportunity to test their prior knowledge about the states of matter. This site, consist of an Interactive Quiz, that is comprised of nine questions related to the states of water. After the participants answer each question, if their response is wrong, try again will pop up, until the correct answer is given. After every three questions, facts are given that are linked to the next set of questions. This web site also contains a three minute animated movie about the States of Matter. To see the questions and correct responses for each question see **Appendix A** at the end of this lesson. Students will try out an experiment demonstrating the states of water. **Appendix B (Handout)**

What is [Water?](http://www.nyu.edu/pages/mathmol/textbook/slg.html) - www.nyu.edu/pages/mathmol/textbook/slg.html

Students will learn all about water as a solid, liquid, and gaseous forms and do experiments to demonstrate the states of water. **Appendix c**

Water Properties <http://www.uni.edu/~iowawet/H2OProperties.html>

States of Matter <http://www.saburchill.com/chemistry/chapters/chapters.html>

MATERIALS

Per Class:

- Chart paper
- A variety of color makers
- Internet Explorer 6.0 Or Netscape Navigator
- One computer with internet connection per group or use one computer and the LCD projector with whole group
- Water Music
- DC/ Cassette Player
- Per group of four students
- Pitcher of water
- An empty soda bottle
- One quarter
- A freezer/cooler for water
- Brain Pop - Experiment With Bob States of Matter Worksheet

Per student:

- 1 Student journal

PREP FOR TEACHERS

Before teaching this lesson, make sure that all of your Web sites are book marked on all of the computers in your classroom, and that all the necessary links are still valid and running. When using media, provide students with a FOCUS FOR MEDIA INTERACTION.

Divide the class up into cooperative learning groups of four. Give students in each group tasks as reporter, recorder, materials manager, and observer. Set up a materials center/ table with all the necessary components and materials and have them in place before the start of the activity.

INTRODUCTORY ACTIVITY: SETTING THE STAGE (Engage)

Step 1

To set the mood for your study of the water cycle, adjust your classroom atmosphere. Play music with sounds of water as you develop students' prior knowledge start with a whole group discussion about water. Ask students to describe all the places they have seen water.. (Possible answers: in a faucet, lake, river, ocean, fountain, and puddle) Place their answers on chart paper. Encourage t your students to become hydrologist. (*hydrologist is a scientist who studies water.*)

Step 2

Then have students to describe the ways that they use water. (Possible answers: to drink, bathe, cook, water plants, flush toilets, swim) Brainstorm how the earth never runs out of water.

Tell the students that they are now going to take a pre- lesson quiz to test their knowledge about the states of water. Using a LCD projector connected to a computer as a whole group activity **or** have students to use computers in cooperative learning groups. Take them to the “Brain Pop” – Website www.brainpop.com. Provide your students with first **FOCUS FOR MEDIA INTERACTION**, asking your students to take the quiz to see what they already know about the states of water. (The site consist ten 9 questions related to the states of water. If the question is not answered correctly, there will be a try again pop up until the correct answer is chosen. After every three questions, a states of matter fact will pop up. Click on the Science Movies icon, then click on the Science icon go the States Matter and play the States of Matter Quiz. Ask the students to answer the 9 questions about the states of matter pre-assessment. Tell students to write the answers to the Quiz in their science journals. **(Appendix A)**

Step 3

Take the students back to the “Brain Pop” – Website www.brainpop.com. Provide your students with a **FOCUS FOR MEDIA INTERACTION**.

After your students have completed the States of Matter Quiz, as a whole group discuss

their results. Play the States of Matter Movie for background information. Tell students to watch the Brain Pop, States of Matter movie and take notes on the important terms and key vocabulary needed to understand the States of Water. Direct the students to do the States of Matter experiment with Bob. **(Appendix B)**

Step 1

Place students into cooperative learning groups of four. Tell the students that they are now going to discuss the three states of water. Using a LCD projector connected to a computer as a whole group activity or have students to use computers in cooperative learning groups. Take them to the “What Is Water” – Website www.nyu.edu/pages/mathmol/textbook/slg.html (At this site students will learn all about water as solid, liquid, and gaseous forms and do experiments to demonstrate the different states of water.) Provide your students with a *FOCUS FOR MEDIA INTERACTION*. **(Appendix C)**

Tell students that water exists in three states- solid, liquid, and gaseous. Ask students to discuss in their groups, **where they might find water as a liquid?** Review by asking the reporter to share three of their answers that are not repeats, and tell students that liquid water is found in many places. You see liquid water coming out of the faucet, when it rains, and running in a river. Pure liquid water is free of salt, rock, soil, and garbage.

Step 2

Ask students to discuss in their groups, **where they might find water as a solid?** Review by asking the reporter to share three of their answers that are not repeats, and by telling students that ice, snow, and frost are examples of water in the solid state.

Liquid water freezes at 0 degrees Celsius. Celsius is scale that measures temperature. What instrument do you use to measure temperature? Winter is a season that you see a lot of solid water. Other examples of solid water are ice cubes, icicles, ice on a skating rink.

Step 3

Ask students to discuss in their groups, **where they might find water as a gas?** Review by asking the reporter to share three of their answers that are not repeats, and by telling students that you don't see anything because gas is invisible. Water in the liquid state may change to water in the gaseous state. Water evaporates to turn into a gas. Gases are colorless and odorless. You cannot see gas, but sometimes you can hear it and smell it. What are some ways that you can hear or smell a gas? Water can evaporate or disappear with the help of heat. Changes in temperature can increase the rate or how long it takes water to evaporate. Evaporate means to disappear. Water can evaporate from soil. It evaporates off wet clothes hanging on a clothesline. Plants release water vapor into the air. We breathe out water vapor.

CULMINATING ACTIVITY

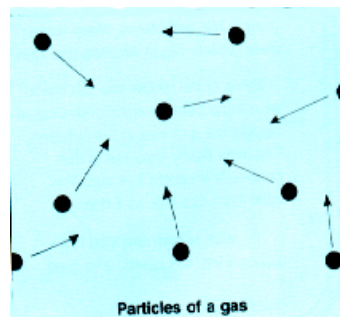
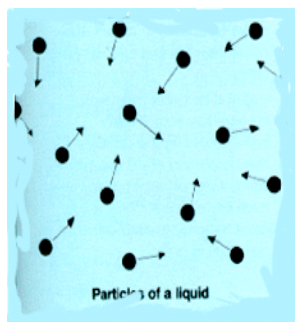
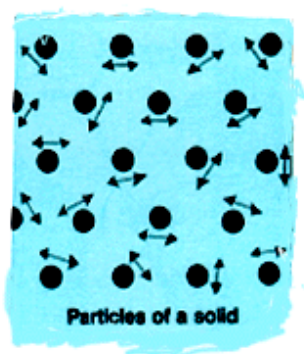
Step 1:

Next, have students do the following investigations.

1. Dry your hand with a towel. Feel your palm. Is it wet or dry?
2. Hold your hand in front of your mouth about 1 inch away from you. Breathe out slowly about 8 times on to the palm of your hand. Do not blow. When you are done, feel your palm. What does it feel like? Is it wet or dry?

Your palm should have felt wet to you. That moist feeling was water vapor. Remember that we breathe out water vapor. If you have a dog or a cat, you can feel the water vapor that they breathe out. Try this with a mirror. See the water droplets form on the mirror. The water vapor that you breathed out is now becoming liquid water on the mirror. Why?

Step 2



Instruct students to sketch these illustrations of the states of water in their science journals. (Appendix B) <http://www.saburchill.com/chemistry/chapters/chapters.html>

Step 3:

ASSESSMENT:

Tell the students that they are now going to take a post- lesson quiz to test their knowledge about the states of water. Using a LCD projector connected to a computer as a whole group activity **or** have students to use computers in cooperative learning groups. Take them to the “**Brain Pop**” – Website www.brainpop.com. Provide your students with a **FOCUS FOR MEDIA INTERACTION**, asking your students to take the quiz to see what they have learned about the states water. Ask the students to answer the 9 questions about the states of matter post-assessment. **(Appendix A)**

CROSS-CURRICULAR EXTENSIONS

SCIENCE AND THE ARTS

Students will make pictures of clouds. Have your students look in science textbooks, on the internet and other sources to find names, identify characteristics, and pictures of the three major types of clouds; cumulus, cirrus, and status. Let them pictures of specific cloud types by gluing cotton batting to large sheets of blue paper. Students may use watercolor paint, chalk to shade the clouds. Have each student show their cloud picture to the whole class. Ask the class to identify the clouds of each picture. Group the clouds of similar type together.

CAREERS

WATER CAREER DAY

Examples of careers:

Water related careers offer rewarding and challenging work. Water related careers include:

Chemistry. Chemists analyze water and determine contaminants that affect its quality. This may involve testing at water treatment plants or analysis of groundwater to see if pollutants have moved through groundwater supplies. Chemistry requires a college education, and quite often, post-graduate work to qualify for more advanced jobs.

Engineering. Water can be a focus of engineering studies. Major engineering projects require environmental impact studies and city development may be based on the ability to engineer around available water supplies. Engineers also control surface water flow for navigation, recreation, and power generation.

Utilities. Wastewater treatment and management is a field growing in importance and complexity as we work to clean water even more before returning it to nature. Water specialists for utilities become involved with plant operations, planning, emergency procedures, and maintenance of the nation drinking water and wastewater plants.

Forestry. Forests and wetlands contain many water resources. How we manage them will govern the quality of our water supplies in the future. Forestry activities related to water can include timber harvest planning to avoid pollution problems, watershed protection, and water analysis to identify and control pollution problems. Forestry experts may work at the Forest Service, State Forester Offices, colleges or universities, or other private organizations.

Agriculture. Water is essential for agriculture, and as water supplies dwindle, their management in agriculture becomes more important for irrigation purposes and to prevent pollution from agricultural sources. Agricultural activities could include genetically engineering crops that require less water to produce and control of non-point source pollution.

Careers related to agriculture may include farming, or employment at a local agricultural extension service or soil conservation service.

Biology. Since water is necessary for all life, biologists must consider water supplies and water quality in determining the health of ecosystems and humans. For example, biologists can be involved in drinking water and wastewater treatment, land management, and aquatic resource management careers. Specialized jobs include fisheries biologists, limnologists, aquatic entomologists, or malacologists.

There are many other water-related jobs and careers. These include service in the Coast Guard, Marines, Army Corps of Engineers, or Navy; working for the U.S. Environmental Protection Agency, the U.S. Geological Survey, state environmental agencies, state or local health departments, state geological surveys, as well as other environmental agencies or private environmental protection organizations; commercial fishing, wastewater treatment plant technician, construction (such as plumbing or septic system installation), service in the merchant marines, meteorologist or weather person, lifeguard; fishing or rafting guide, and others. Many jobs and careers have either a direct or indirect relationship to water or water supplies.



GE Fund



Brain POP Quiz

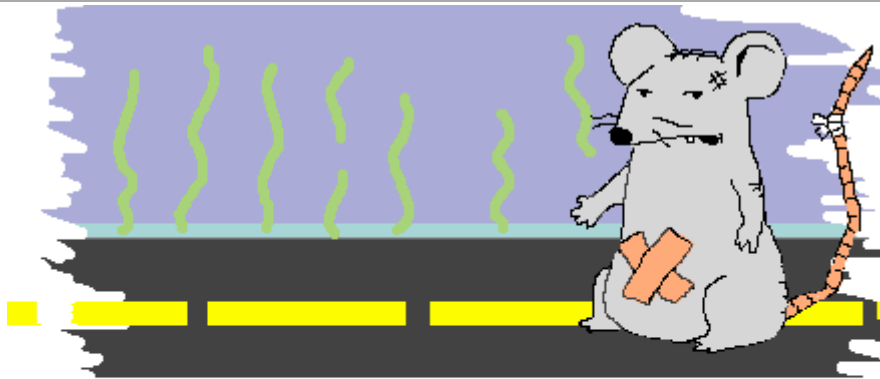
States of Water Questions and Answers Pre and Post Test

1. How many states of matter are there?
A 3 or 4
2. What are the four states of matter?
C Solid, liquid, gas, and plasma
3. What is matter?
A Anything that has mass and take up space
4. How are solids characterized?
B They have a fixed volume and shape
5. How are liquids characterized?
C They have a fixed shape
6. How are gases characterized?
B They have neither a fixed shape nor a fixed volume
7. What is plasma?
B A state of matter that exists only at very high temperatures or low pressures
8. How do you change a state of matter?
C Increase or decrease its temperature
9. Which of these states of matter has the least energy?
B solid

www.brainpop.com

EXPERIMENT WITH BOB

STATE:

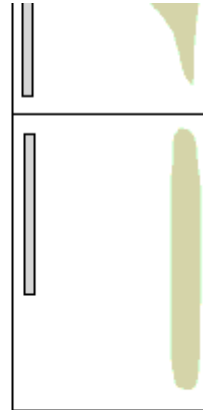


Gases are all around us!
The air we breathe is a gas after all.
Let's do an experiment with air to
see if its volume changes along with the temperature!



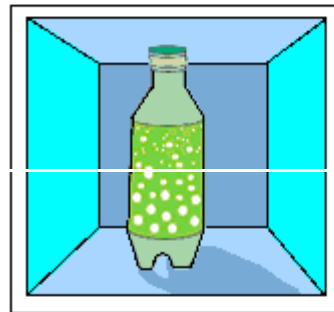
You will need:

- An empty soda bottle
- A quarter
- A Freezer
- Water



Step 1
Leave the empty, uncapped
soda bottle in your
freezer for 30 minutes.

Step 2
Remove the bottle
from the freezer.



Step 3
Sprinkle a few drops of water
onto the quarter and place it
over the opening of the bottle.



What happened to your quarter?
Did it move? Mine did!
That means that the gas
expanded when it was brought
out of the freezer into warmer air.

www.brainpop.com

States of Water

Water exists in three states- solid, liquid, and gaseous.



Liquid Water-

Liquid water is found in many places. You see liquid water coming out of the faucet, when it rains, and running in a river. Pure liquid water is free of salt, rocks, soil, and garbage.



Ice, snow, and frost are examples of water in the solid state. Liquid water freezes at 0 degrees Celsius. Celsius is scale that measures temperature. What

instrument do you use to measure temperature? Winter is a season that you see a lot of solid water.

Other examples of solid water are ice cubes, icicles, ice on a skating rink.



You don't see anything because gas is invisible. Water in the liquid state may change to water in the gaseous state. Water evaporates to turn into a gas. Gases are colorless and odorless. You cannot see gas, but sometimes you can hear it and smell it. What are some ways that you can hear or smell a gas?

Water can evaporate or disappear with the help of heat. Changes in temperature can increase the rate or how long it takes water to evaporate. Evaporate means to disappear. Water can evaporate from soil. It evaporates off wet clothes hanging on a clothesline. Plants release water vapor into the air. We breathe out water vapor.

TRY THIS!!!

1. Dry your hand with a towel. Feel your palm. Is it wet or dry?
2. Hold your hand in front of your mouth about 1 inch away from you. Breathe out slowly about 8 times on to

the palm of your hand. Do not blow. When you are done, feel your palm. What does it feel like? Is it wet or dry?

Your palm should have felt wet to you. That moist feeling was water vapor. Remember that we breathe out water vapor. If you have a dog or a cat, you can

feel the water vapor that they breathe out. Try this with a mirror. See the water droplets form on the mirror. The water vapor that you breathed out is now becoming liquid water on the mirror. Why?

The changes from a solid to a liquid to a gas or from a gas to a liquid to a solid are called a phase changes. When substances such as water change phase, its physical properties change, but not its chemical properties. Melting, freezing, condensation, and evaporation are examples of phase changes. The phase of a substance depends on temperature and pressure. The pictures below show how molecules of water look in each phase. Notice how solid water molecules are bunched together and how far apart the gas molecules are.

<http://www.saburchill.com/chemistry/chapters/chapters.html>

