
WATER CYCLE BOOGIE

FOR THE TEACHER

Discipline

Physical Science

Themes

Patterns of Change

Systems and Interactions

Key Concept

The water cycle is the continuous movement of water from the ocean to the air to the land and back to the ocean.

Synopsis

Students learn about the water cycle through music, movement and creative dramatics. They observe and demonstrate water evaporation, condensation, and precipitation.

Science Process Skills

observing

communicating

comparing

ordering

categorizing

Social Skills

share ideas and information

check for understanding

encourage

Vocabulary

condensation

hydrogen

water cycle

evaporation

oxygen

precipitation
molecules

MATERIALS

INTO the activities

- pictures of water in a variety of places
- tag board or paper for sentence strips
- construction paper
- glue
- magazines
- scissors

THROUGH the activities

- butcher or chart paper
- shallow pan
- cloth or paper towel
- hot plate
- small pot with lid
- salt
- ice cubes
- small mirrors or pieces of glass
- chalkboard
- glass or can
- 3 ice cube trays
- freezer
- 1 gallon container
- 5 gallon container
- paper or chart for graph
- 2 pint or quart jars
- food coloring
- key concept written in large letters on a strip of butcher or chart paper

For each small group;

- 1 glass
- 10-20 marbles or pennies
- toothpicks
- eye droppers
- waxed paper
- 1 penny (per student)

INTRODUCTION

Earth is the only planet in our solar system known to contain water, and life as we know it could not exist without it. Water is fundamental to all life. It makes up nearly three quarters of our planet's surface and three quarters of our own bodies. We find it in the foods we eat and drink and the plants we grow in our yards. It is in the air as rain, snow, and fog. We enjoy it in the

lakes, streams, and oceans we visit. Water in the forms of rivers, waves, and glaciers are a powerful force in physically shaping the earth. Large bodies of water keep our climate from getting too hot during the day and too cold at night.

Water is not “made” during rain and snowstorms, rather, the same water is recycled from year to year and takes on each of its forms depending on seasonal changes. When you get a fresh glass of water from the tap, that water is new to you, but it isn't really new water at all. That water has been recycled time and time again, from when the earth was formed, from the time that dinosaurs roamed the land and throughout all of history. You might be drinking water that was used by Cleopatra! The important fact to remember is that we now have all of the water that we are ever going to have on this planet. The water cycle is nature's way of ensuring that water is used and reused.

Water is moving continuously from the earth's rivers, lakes, and ocean to the skies and back to the earth again. As the sun's energy heats up the earth's water, it becomes a gas or vapor that will rise up into the lower layers of the atmosphere. The water vapor is carried aloft by air currents where it cools and condenses to form tiny drops of water. These drops of water will eventually form clouds that, when big enough, will fall back to earth in the form of rain or snow.

As air temperatures change, the structure of the water changes as well. In different seasons and climates water can be seen in its different forms: solid, liquid, and gas. During the hot summer months water evaporates rapidly into the air and can be felt as humidity or seen as fog near large bodies of water. Fall rains replenish summer-parched streams, lakes, and estuaries. The winter snowfall is frozen water that the spring can thaw and replenish surface and ground water.

While the recycling process seems almost perfect, we need to make sure that we take care of the water that we have. The recycling process retains many pollutants. There is no filtering system to rid our waters of non-biodegradable wastes, so we accumulate acid rain and pesticides in our lakes and oil in our oceans. We also need to monitor our consumption of water to ensure that we have enough to go around.

Although the earth's surface is about 75 percent water, only 3 percent of that is freshwater we can use. Of that 3 percent freshwater, 75 percent is found in polar ice caps and glaciers, making it difficult to use. We need to be aware of the limits of this precious resource so that we are able to manage it wisely as responsible stewards of our water planet.

INTO

INTO ACTIVITIES

Partner Parade

See the *Teaching Strategies* section for how to present this activity.

Give each student a picture of some form of water to use as a prompt.

- What are some of the ways that you use water? (bathe in it, drink it, make juice from it)
- Where are some of the places that you might see water? (rivers, lakes, ponds, ocean, tap, swimming pool)
- What or who needs water to survive? (all plants and animals)
- Where does water come from? (from rain, through the water cycle, from reservoirs to the tap)
- What would you like to know about water and where it comes from?

Make a sign that reads “What We Already Know About Water.” In small groups have students make several sentence strips that talk about what they already know about water. Organize the student sentence strips into categories and place them underneath the sign. Possible categories might include places we find water, animal use or plant use, and human use.

Make another sign that reads “What We Want To Find Out About Water.” Have student groups make several sentence strips that talk about what they would like to find out about water and place them under that sign.

Make a third sign that reads “What We Have Learned About Water.” After completing the activities, ask students to write sentence strips about the new information they've learned about water.

How Much Water Are We?

Before recess tell students that you want them to really run around and get hot while playing. When students have just returned from recess (hopefully all hot and sweaty) begin a discussion about how our bodies need water. Showing students a pie graph or the four quarters of an apple, tell them that approximately $\frac{3}{4}$ of our bodies are water (in the forms of blood, sweat, urine) with a similar salt content to that of the ocean. See if the kids can feel their own water through sweat and notice how it tastes salty like ocean water.

Ask students:

- How they feel after running around? (thirsty maybe?)
- Discuss how important it is for us to constantly replace our fluids by drinking water.
- Discuss some of the other ways that we consume water? (drink it in all liquids, eat it in fruit and vegetables)

Water Disguises

Look at pictures of water in its various forms (disguises)— liquid, solid, gas— and discuss each one. Write the words liquid, solid, gas on the board.

Brainstorm and list all the different ways we experience water in its liquid form

(tap water, from a bottle, rain, ponds, lakes, rivers, and oceans). Next brainstorm all the ways we experience water in its solid form (ice, snow, sleet, hail, icebergs, glaciers). Finally, brainstorm all the ways we find water in its vapor or gas form (fog, mist, clouds, steam).

Using old magazines, cut up pictures to make collages that illustrate all three disguises water can take. Have students share their collages with other students and discuss them.

Assessment

- Sentence strips for small group assessment
- Collages and pictures for individual assessment

THROUGH THE ACTIVITIES

Teach your students the words, hand motions, and whole body movements to the song “Water Cycle Boogie” by the Banana Slug String Band. Discuss the meaning of the words in the song as you learn them with your students. Let your students know they'll be exploring the words of the song by conducting experiments and making observations about water.

Water Cycle Boogie

(Note: Music is found below)

(Chorus)

Evaporation, Condensation, Precipitation
Water cycle boogie goes round and round
Water cycle boogie goes up and down

The sun gives the water cycle power to spin
The water goes up and down again
The surface of all water heats up with the sun
The vapor rises up and then the boogie's begun
What's that called? What's that called? (It's evaporation)

(Chorus)

Water holds together chemically
Hydrogen bonding is what you see
All those airborne vapors they squeeze together
To form a cloud that could change the weather
What's that called? What's that called? (It's condensation)

(Chorus)

All those dark clouds can't hold together
Water boogies down bringing stormy weather
Fog, rain, hail, flurries, ice, and sleet
Splish, splash, and crunch underneath your feet
What's that called? What's that called? (precipitation)

(Chorus)

Two thirds of earth is water, it's true
Gives life to every plant and animal too
Respect water's power, only use your share
Don't waste a drop, there's none to spare
Let's do the water cycle boogie again
Let's go for another spin!

(Chorus)

The Water Cycle Boogie

Make a poster for the chorus in the song “Water Cycle Boogie” that is large enough for the whole group to read.

Evaporation, Condensation, Precipitation
Water cycle boogie goes round and round
Water cycle boogie goes up and down

The **water cycle** is the natural process that continually recycles and transports water from the land and the ocean to the clouds, and back to the land and surface waters of the earth.

Hand motions for the chorus

Have students stand up with their hands at their sides. While singing the word “evaporation” each time, have both arms go up above their heads to the beat of the music while wiggling their fingers to indicate water evaporating up into the air. While singing the word “condensation” each time, have students put their hands on their heads to form a round cloud. While singing the “precipitation” each time, have students bring their arms down to their sides with their fingers wiggling to indicate that it's raining. While singing the phrase “Water cycle boogie goes round and round”, have students shake their fingers and upper torso from side to side while turning around to the beat of the music. While singing the phrase “water cycle boogie goes up and down” have students jump up and down. Repeat hand and body movements each time the chorus is repeated in the song.

Evaporation

Place your poster of the evaporation verse just below a sign that says “Evaporation.” Discuss the meaning of the verse with your students.

The sun gives the water cycle power to spin
The water goes up and down again
The surface of all water heats up with the sun
The vapor rises up and then the boogie's begun
What's that called? What's that called? (It's evaporation)

When the sun warms the surface waters of the land and the sea it turns it into invisible water vapor. The water vapor (which is a gas) rises up to the air or atmosphere. We call this process **evaporation**. We know evaporation as fog, dew, or water vapor.

As a demonstration:

- Take a shallow pan and make a line inside it about half way up the side. Fill the pan with water up to the line and place the pan of water in a warm, sun-lit spot for several days. Check the water level in the pan several times each day.

Ask students:

- What do you observe?
- Where did the water go? (it evaporated into the air)
- Take a towel (paper towels work quickly) or a piece of clothing and run it under the faucet until it is visibly wet. Hang it somewhere in the classroom to dry. Have students check how quickly the article dries over a several days.

Ask students:

- Where did the water go that was in the article? (it evaporated into the air)

Try it on a cloudy day and then try it on a sunny day. Ask students:

- Was there a difference in how long it took for the article to dry?
- Boil a small pot of water on a hot plate. Notice the vapor or steam that escapes from the pot as it heats up. Ask students:
- What is another word for the steam that escapes from the pot? (evaporation)

This is the same effect the sun has on the waters of the earth.

- Do this again, only this time add a teaspoon of salt to the water before heating it up. Ask students:
- What happens to the salt?
- Where do you think the salt in the ocean goes when ocean water evaporates? (It stays in the ocean)

Condensation

Place your poster of this verse just below a sign that says “Condensation.” Some of these investigations can be conducted by students and others need to be led as a demonstration.

Water holds together chemically
Hydrogen bonding is what you see

All those airborne vapors they squeeze together
To form a cloud that could change the weather
What's that called? What's that called? (It's condensation)

In every water molecule there are two hydrogen atoms and one oxygen atom that combine to create a remarkably strong bond. This hydrogen bond means that water molecules are attracted to one another and will tend to cluster together. When water vapor is released into the air through evaporation, it is carried up into the atmosphere by air currents. Once up there, it becomes more compact as the water vapor cools and forms tiny droplets of water. This process is called **condensation**. When millions of little droplets come together in the sky they form a cloud.

Small group surface tension investigations

- To see how water holds together chemically through hydrogen bonding, you can observe what we call surface tension. Slightly overfill a glass of water and observe the bubble that forms over the top. This bubble is caused by the water molecules sticking together. Add marbles or pennies to the glass one by one to see how far you can fill the glass before you break the surface tension.
- Have students place several drops of water on waxed paper. Ask students:
- What shape are the drops?

Notice how a bubble forms. Water is attracted to itself through surface tension. The surface tension is drawing the water molecules together to form bubbles. Use a toothpick to push the bubbles around. Ask students:

- What happens when two drops get close together? (they are attracted to each other and bond to form one drop)
- Give each student in a small group a penny, a small cup of water, and an eye dropper. Have students put as many drops of water on top of the penny as they can, counting as they go. Ask students:
- How many drops did it take to break the surface tension?

Class demonstration of condensation

- Heat a covered pot of water on a hot plate. When it is near boiling, observe the steam that is escaping from the covered pot. This steam is water evaporation. Remove the lid and see the water droplets that have formed on the inside of it. These water droplets are called condensation.
- Put an ice cube in a glass or metal can with a small amount of water. Watch condensation form on the sides of the container as the warmer outside air meets the cooler water in the container.

Small group or individual demonstration of condensation

- Breathe on a piece of glass, mirror, or the chalkboard and see the millions of little droplets of water that form on the surface. You can even draw your name in the little water droplets! When the warm air of your breath meets the cooler outside air the little water droplets form condensation.

Precipitation

Place your poster of the precipitation verse just below a sign that says "Precipitation."

All those dark clouds can't hold together
Water boogies down bringing stormy weather
Fog, rain, hail, flurries, ice, and sleet
Splish, splash, and crunch underneath your feet
What's that called? What's that called? (precipitation)

Precipitation is what happens when there is a great deal of water vapor in the air. The water vapor is carried aloft where droplets form a cloud. These droplets join together to form bigger and bigger drops. When the cloud is large and heavy enough, the water will fall back to earth as rain or snow or hail, depending on how cold it is outside. If the temperature in the atmosphere is above freezing, this precipitation may take the liquid form of rain. Temperatures at or below 32 degrees F will bring solid forms of precipitation like snow, sleet, or hail.

As a demonstration

- Boil a small pot of water on the hot plate. Hold a piece of glass or mirror above the pot of water until water drips down. This is similar to what happens when it rains.

Individual investigation

- Place water in ice cube trays taking care to fill each individual cup to the very top. Put the ice cube trays into a freezer until the water is completely frozen. Remove the trays and give one ice cube to each student. Have students observe how the water has changed its form from a liquid to a solid. Ask students:
 - What caused the change?
 - What do you suppose happens to water drops in the atmosphere when the air temperature reaches the freezing point? (snow, hail or sleet will form)

Save Water !!

Place your poster of this final verse below a sign that reads "Save Water".
Two thirds of earth is water, it's true
Gives life to every plant and animal too
Respect water's power, only use your share
Don't waste a drop, there's none to spare
Let's do the water cycle boogie again
Let's go for another spin!

Here are some suggestions of things that you can do to promote saving water (conservation) with your students at school and some that they can do at home with their parents.

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- Point out that it takes a lot of water to do everything. While water is recycled naturally through the water cycle, we need to share it so that everyone has enough—including plants, fish, and other animals.
 - Show students what one gallon of water looks like. A leak that fills up a cup in 10 minutes will waste over 3,000 gallons of water a year. That's over 25,000 glasses of water in a single year!
 - Be a water-leak detective. At school you can check all faucets, toilets, hoses, and drinking fountains to make sure they don't have a slow leak. Students can do the same at home and report back to the class.
 - Turn off the water! We waste lots of water each day by letting the water run while we're doing things. Show students what five gallons of water looks like. If you leave the water running while you brush your teeth you use five gallons of water. Show students what a half gallon looks like. If you turn the faucet off while brushing your teeth you use only half a gallon. If you leave the water running while you wash the dishes you use 30 gallons of water. If you wash your dishes in a basin of water you use only 10. Make a graph to illustrate the amount of water used in two different ways to brush your teeth and wash the dishes.

Water Cycle In A Jar

- Make a model to demonstrate how the water cycle works. Take two same-sized jars and pour an inch of colored water in one of them. Place a rock in the center. Take the other jar and invert it over the first. Tape the two jars together and place the two jars in a warm, well-lit place. Observe the jars over several hours. Ask students:
 - What collected on the sides of the jars? (condensed moisture)
 - Where did the moisture come from? (evaporated water)
 - What drips down from the top and sides of the jar? (precipitation)
 - Does the color in the water evaporate and condense on the sides of the jars? (No, it stays in the bottom of the jar just like the salt stays in the ocean when water evaporates)

Discuss how this model demonstrates the words in the song “Water Cycle Boogie.”

Debriefing

Hold up the key concept on butcher paper and have one or more students read it aloud. Post the concept on the wall.

Assessment

- Class records about water
- Individual student worksheets, charts or graphs

BEYOND THE ACTIVITIES

Water Pollution Investigation

- Ask students: **Have** you ever seen water that was polluted? Where? How could you tell? Water pollution is something that happens when we carelessly put things in the water that don't belong there. Sometimes even without realizing it. Discuss different types of pollution with your students. Discuss the need to keep our water clean and healthy so that people, animals, and plants have water to drink, and fish and other creatures will have a place to live.
- Oil from our cars is sometimes dumped into the streets and gets into storm drains. Fertilizers from our gardens can get washed into underground water systems, watersheds and wetland areas. Find out what types of substances should not be dumped down the drain.
- Rivers, lakes, and the ocean get polluted by carelessly thrown garbage. The ocean has long been used as a place to dump garbage and old fishing gear, some of it dangerous to animals that live there. One way to help take care of our water is by adopting a beach, stream or other local water home. To learn about the Adopt-A-Beach program write to:

The Center for Marine Conservation
1725 De Sales Street NW, Suite 500
Washington, DC. 20036

- For information on how to adopt a local stream send for a free Save Our Streams booklet to:

The Izaak Walton League of America
1401 Wilson Blvd., Level B
Arlington, VA 22209

- For more information and materials on water and water conservation contact:

The California Department Of Water Resources
1416 Ninth Street, Room 338
PO. Box 942836
Sacramento, CA 94236-0001
(916) 445-9371

Interdisciplinary Water Activities

Language Arts: Write a story about how the ocean got its water.

Art: Illustrate your story about the ocean. Draw a diagram of how the water cycle works and label the different processes.

Drama: Act out the water cycle through the life story of one drop of water.

Literature: Read stories about water and its many uses.

Geography: Show the students a globe and point out how much of the planet is water. Look on a local map and find the closest lakes, streams, rivers, marshes, bays, and ocean to your school. Try to figure out how water is recycled in your area.

Health: Talk about the fact that our bodies are about $\frac{3}{4}$ water and how anything that we put into our bodies (i.e. food and water, drugs—good or bad) is moved through our bodies by our heart via our circulation system.

Math: Make predictions, chart and graph how long it will take for a jar of water to evaporate. Figure out what (if any) the difference is in volume and weight between water that has been frozen and water in its liquid form.

Social Studies: Discuss social issues of shared water use and water pollution. Investigate water use at home and at school to make sure water waste is kept to a minimum.

Field Trip: Visit your local waste water treatment center to learn about where your tap water comes from.

Water Cycle Boogie

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(triple feel)

E - va - po - ra - tion, Con - den - sa - tion,
Pre - ci - pi - ta - tion The
wa - ter cy - cle boo - gie goes round and round The
wa - ter cy - cle boo - gie goes up and down The
sun gives the wa - ter cy - cle po - wer to spin The
wa - ter goes up and down a - gain The
sur - face of all wa - ter heats up with the sun The
va - por ri - ses up and then the boo - gie's be - gun What's that called?
What's that called? E - va - po - ra - tion

Water Cycle Boogie

(Chorus)

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