My World and Me™

RESOURCES AND THE ENVIRONMENT

Making a Water Cycle

Written by Barbara Tharp, M.S., Nancy Moreno, Ph.D., and Paula Cutler, B.A.

from *Resources and the Environment Teacher's Guide* and for *Tillena Lou's Big Adventure*.

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This activity is part of the Resources and the Environment teaching unit. The *teacher's guide* may be used alone or with integrated unit components. The Resources unit is comprised of the guide, *Tillena Lou's Big Adventure* (storybook), and two supplements: *The Reading Link* and *The Math Link*. For more information on this and other educational programs, contact the Center for Educational Outreach at 713-798-8200, 800-798-8244, or visit http://www.bioedonline.org./

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Making a Water Cycle

Students observe a simple model of the water cycle constructed of sand and ice in a plastic shoe box.

CONCEPTS

- Water can be found naturally as a solid, a liquid and a gas.
- Water circulates among these three states in the water cycle.

SKILLS

- Predicting
- Making and recording observations
- Drawing conclusions

TIME

Preparation: 10 minutes
Class: 15 minutes to set up; 30 minutes to observe and draw conclusions.

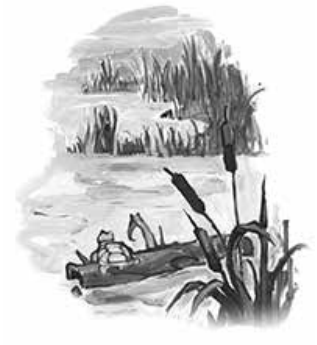
MATERIALS (see Setup)

Teacher Materials

- 20 ice cubes (approx.)
- 2 clear cups or beakers
- 2 cups of sand
- Clear plastic box (shoebox size or slightly larger)
- Cup, heat resistant
- Electric hot plate or microwave
- Ice cubes, approx. one cup
- Lamp with incandescent bulb (if sunny window is not available)
- Large rubber band, 7 in. x 1/8 in. (to hold plastic wrap on the box)
- Plastic cup, 8-oz graduated
- Plastic wrap (to cover the box)
- Pot or pan, small
- Water, approx. one cup

Materials per Student

- Copy of the student sheet



Water is constantly moving in a cycle. Water is one of the few substances that can be found in all three states—solid, liquid and gas—at any given time somewhere on Earth. For example, snow and ice are present at the poles, as well as on the tops of high mountains. Liquid water is abundant in many places, including lakes, rivers, oceans, and underground. Water vapor, the gas phase of water, usually is present in the air around us (up to 5%), and can be observed as steam when liquid water is heated.

If water were not continuously cycling among its three states, the world's stores of freshwater quickly would become depleted or polluted. Fortunately, our supply of freshwater continually is collected, purified and redistributed as part of the water cycle. This continuous process replenishes our water sources through precipitation (rain, mist, snow and sleet, for example). Some of the water from precipitation soaks into the ground. The rest runs off into streams, lakes and the oceans. Heat from the sun makes water vapor from the oceans, lakes, rivers, trees, plants, and land in a process called evaporation. As it cools, the water vapor forms clouds. This is called condensation. Water vapor collects in the atmosphere until there is too much for the air to hold in clouds, leading to rain or snow.

This activity allows students to observe the water cycle.

SETUP

Collect materials needed and conduct this activity with students observing.

Heat a cup of water until it is very hot or boiling to use for a demonstration.

PROCEDURE

1. In front of class, compare a glass of water to a glass of ice. Ask, *How are the water and ice alike and how are they different?* Point out that the water and ice are two different states of matter, much like the liquid and solid chocolate on the banana pop.
2. Explain that water can exist not only as a liquid and a solid, but also as a gas. Show students the steam rising from the surface of the hot water. Explain that the water is changing from a liquid to a gas. Make sure that students understand the difference between the gas (gasoline) used in a car and a gas such as air.
3. In front of the students, measure out two cups of sand and place it in a pile at one end of the clear, plastic box.
4. Smooth the sand to create a hill at one end of the box, gradually sloping it to cover about 2/3 of the bottom of the box. This will form the land in the model.
5. Place 20 ice cubes on top of the "hill" in the box. The ice cubes will be

"snow" and "ice" in the model.

6. Cover the box with a sheet of clear plastic wrap and secure it with a large rubber band and/or tape. (If using plastic storage boxes, cover securely.)
7. Discuss the model with the class. Ask, W*hich part of the model could represent land? Which part could represent snow on the tops of mountains? Do you think a lake could form? Where might it be?* Ask students, *What do you think will happen if we put the box in the sun?*
8. Place the box in a sunny window, outside or a under a lamp with an incandescent (not fluorescent) light bulb. If possible, have the students observe the box at intervals throughout the day. Otherwise, have them observe the box within the next day or so.
9. Instruct students to draw the water cycle box in their journals and to predict what might happen over time.

Session 2: Looking at results

1. Have the students observe the box without removing the cover. Ask them to note the changes that have occurred inside the box. Ask, *What happened to the ice cubes?* [they melted] *What else is different about the inside of the box*? [water has collected on bottom] In most cases, at least a few drops of water will have condensed on the inside of the covering. Ask, *Where did the drops of water came from?*
2. Help students understand that all three states of water have been present in the box. Review the different states in which water can be found—ice or snow (solid), liquid water and water vapor. Breathe on a mirror or piece of glass to show students how water vapor condenses on a surface. OR boil a small container of water, so that students may observe the cloud of steam. Hold a glass or mirror above the steam.
3. Remove the cover from the box. Have students observe the surface of the sand. Ask, *Has the surface of the sand changed? In what ways has it changed?*
4. Talk about where the water in the box has gone. Ask, *Where was all of the water in the box when we started? Where is the water now?* If students have not noticed that the surface of the sand is wet, point out that some of the water has run into the bottom of the box to make a "lake" and some has soaked into the sand. Help students understand that the same processes take place outside when it rains and snows.
5. Give each student a copy of "The Water Cycle" page, or place it on a document camera. Have students identify the forms in which water is present in the diagram (for example, snow on mountain tops is a "solid" form of water, and water evaporating from the ocean represents water in a "gas" phase). If using individual copies with very young students, direct each child to place a sticker everywhere on the page where he or she can find some form of water.

EXTENSIONS

- Have students design experiments to test what happens to chemicals in soil by placing drops of food coloring on the sand in the shoeboxes before adding the ice cubes. Ask them to note where the colors end up in the system.
- Instead of using a box, add small amounts of sand and ice to plastic resealable bags. Tape the bags to a window.
- To help students understand evaporation, fill a pie pan with water that is colored with blue food coloring. Set it out in the classroom where students can observe it. The initial water level will leave a blue stain. Encourage students to note each day the water level so that they can witness its evaporation. Mark the water level each day and chart it until the water is gone.
- Teach the students a song they can sing to the tune of "Oh, My Darling Clementine." The alternate lyrcs are:

  Evaporation,
  condensation,
  precipitation
  on my mind.
  It is called the
  water cycle,
  and it happens
  all the time."

  Add hand movements or point to a chart of the water cycle as you sing.
- Challenge students to think about what would happen if other substances (for example, chemicals, oils, etc.) also were present either on the surface or mixed in the sand.

The Water Cycle