

THE RETURNING RAINDROP

OBJECTIVES

The student will do the following:

1. Realize that water moves in a never-ending natural cycle.
2. Build a model of the water cycle in the form of a terrarium.
3. Explain how a terrarium demonstrates the water cycle.

BACKGROUND INFORMATION

Water moves in a never-ending natural cycle, so the water you are using may have been a drink for some dinosaur! The forms of water are always changing. They move from sky to earth and back to the sky again. This is called the water cycle. Water falls to earth as rain or snow. Some of the water soaks into the ground and is stored as groundwater. The rest flows into streams, lakes, rivers, and oceans. The sun warms surface water

and changes some of it into water vapor. This process is called evaporation. Plants give off water vapor too in a process called transpiration. The heated water vapor rises into the sky and forms clouds. When the vapor in the clouds condenses, it falls back to the earth as rain or snow. The water cycle has then come full circle and begins again.

Terms

condensation: the change of water from a gas to a liquid.

evaporation: the process of converting or changing into a vapor.

precipitation: water droplets or ice particles condensed from atmospheric water vapor and sufficiently massive to fall to the earth's surface, such as rain or snow.

water: a resource needed by all living things in an ecosystem.

water cycle: the cycle of the earth's water supply from the atmosphere to the earth and back which includes precipitation, transpiration, evaporation, runoff, infiltration, and storage in water bodies and groundwater.

water vapor: the gaseous state of water.

SUBJECTS:

Science, Art, Social Studies

TIME:

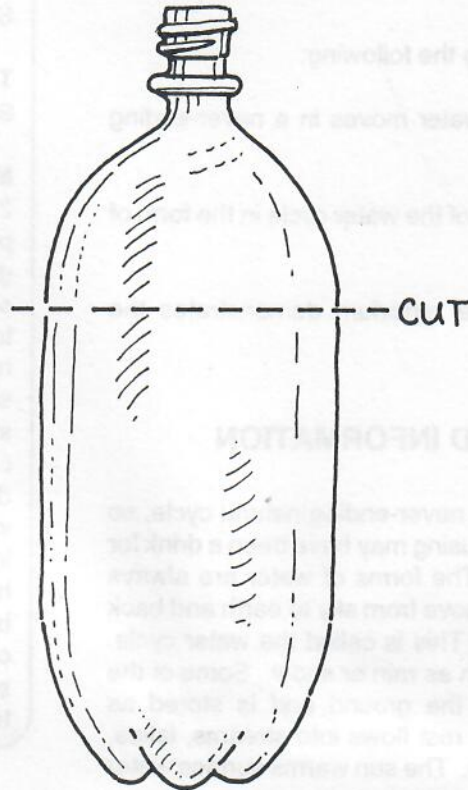
90 minutes

MATERIALS:

2-liter clear plastic bottles with caps
potting soil
gravel
small plants or moss
tape
ruler
scissors (teacher use only)
student sheets (included)
crayons or colored markers (optional)
drawing paper (optional)
writing paper (optional)
ice cubes (optional)
heat source (optional)
beaker, jar, or saucepan (optional)
cookie sheet (optional)
sealable plastic bag (optional)
teacher sheet (included)

ADVANCE PREPARATION

- A. Gather the materials for the terrarium(s). (NOTE: One terrarium can be made for a class demonstration or each student or team of students can make one. Materials for each terrarium include: a 2 liter clear plastic bottle, 2 inches (5 cm) of potting soil, small plants (moss works great), 1/2 inch (1.25 cm) of gravel, and tape.
- B. Cut bottle(s) ahead of time. (NOTE: Scissors easily and evenly cut the plastic bottles.)



- C. Make copies of each of the two student sheets for each student's use in follow-up exercises.

PROCEDURE

- I. Setting the stage
- A. Have the students name all the ways they use water in a day. Encourage them to include ways that water is used indirectly (e.g., food preparation, manufacturing, farming, etc.).
- B. Tell the students the same water they are using today has been on earth from its beginning. It is recycled continuously in the water cycle.
- II. Activity
- A. Introduce and explain the new terms using the chalkboard (evaporation, water vapor, condensation, precipitation, water cycle). Give everyday examples of each term.
1. Condensation - water droplets on the outside of a cold soda can

2. Precipitation - snow, rain, sleet, hail
 3. Evaporation - dew disappearing from the grass
 4. Water vapor - steam rising from a boiling pan of water
 5. Water cycle - snowfall or puddles appearing and disappearing (The technical term is the "hydrologic cycle." If your students enjoy "big" words, introduce this term and discuss with them the "hydro-" root word.)
- B. So that students may observe the water cycle, build a terrarium (or have students or teams build their own). (NOTE: See teacher sheet, "Terrarium Concept.")
1. Place 1/2 inch (1.25 cm) of gravel in the bottom of the bottle. (This is for drainage.)
 2. Cover the gravel with about 2 inches (5 cm) of rich potting soil.
 3. Plant the small plants or moss you have gathered.
 4. Gently water the soil until moist.
 5. Place the top back on the bottle and tape securely in place.
 6. Place in a well lighted – but not too sunny – area. If all goes well, the plants will thrive and the water cycle can be observed all year.
- C. Together with the students, observe the container after 24 hours. Note all changes and discuss the water droplets on the inside of the terrarium(s).
- D. Ask the students how this demonstrates the water cycle.
- E. Ask the students where the droplets come from and where they go.

III. Follow-Up

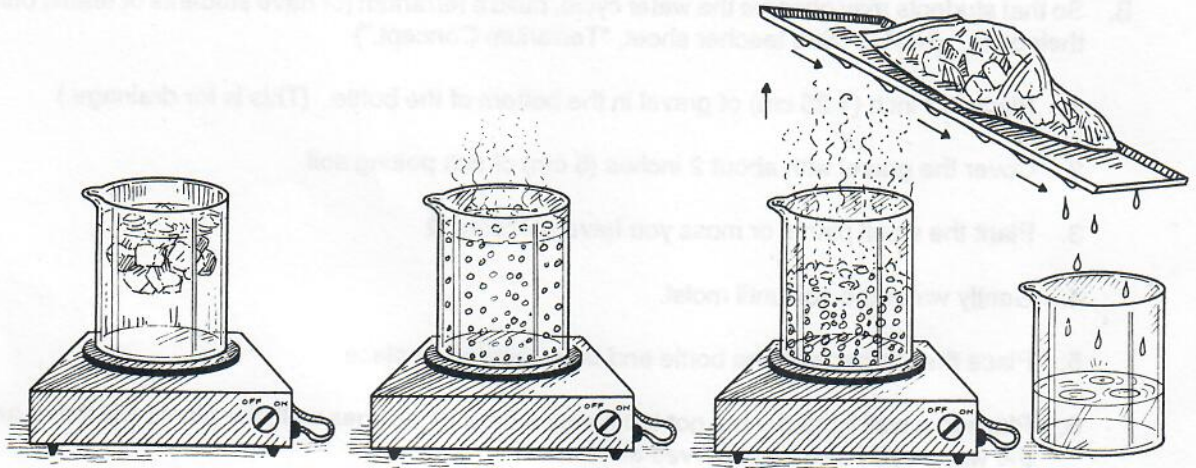
- A. Have the students complete the water cycle student sheet, "The Returning Raindrop." List the terms on the board. (NOTE: They may color the picture when they are finished.) (Answers: 1. evaporation, 2. condensation, 3. precipitation, 4. water cycle.)
- B. Have the students draw a representation of the water cycle demonstrated in the terrarium. (See the teacher sheet.)
- C. Relate the water cycle to lakes, rivers, or other water sources in your immediate area.
- D. Have the students complete the water cycle term sheet, "Water Cycle Matching." (Answers: 1A, 2D, 3E, 4B, 5C, 6F, 7G.)

IV. Extensions

- A. Discuss ways that water supplies become polluted and the water quality declines.
- B. Have the students write a story about being a raindrop and traveling through the water cycle.

C. Demonstrate the three forms of water (solid, liquid, gas) as depicted below.

1. Ice cube - solid
2. Liquid - melted ice cube
3. Gas - evaporated water from melted ice cube.



RESOURCES

The Energy Sourcebook: Grades 3-5 Unit, Tennessee Valley Authority, 1990.

Hackett, Jay K., Science in Your World (Grade 3), Macmillan McGraw-Hill, New York, 1991.

"The Story of Drinking Water," American Water Works Association, Denver, Colorado, 1984.

TVA: A World of Resources, Tennessee Valley Authority, 1986.

"Water Fun," Los Angeles Department of Water and Power, Los Angeles, California, 1984.

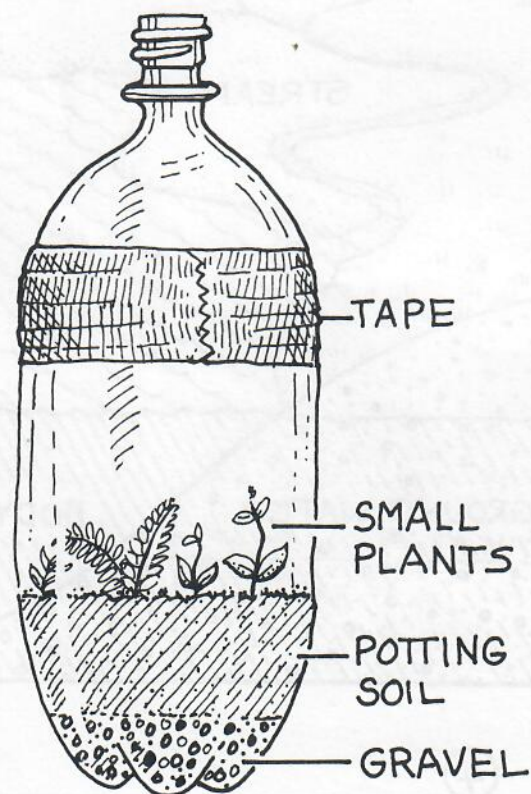
TERRARIUM CONCEPT

A terrarium is a simple and effective way for your class to watch the water cycle operating on a small scale. The plants take up moisture from the soil and release it through their leaves. The water molecules later condense on the inside of the plastic bottle and "rain" back to the soil. You never need to add water to the terrarium as long as it stays closed.

This classroom water cycle works in miniature much the same way the water cycle works on a large scale for our planet. It is also a good introduction to the concept of ecological cycles.

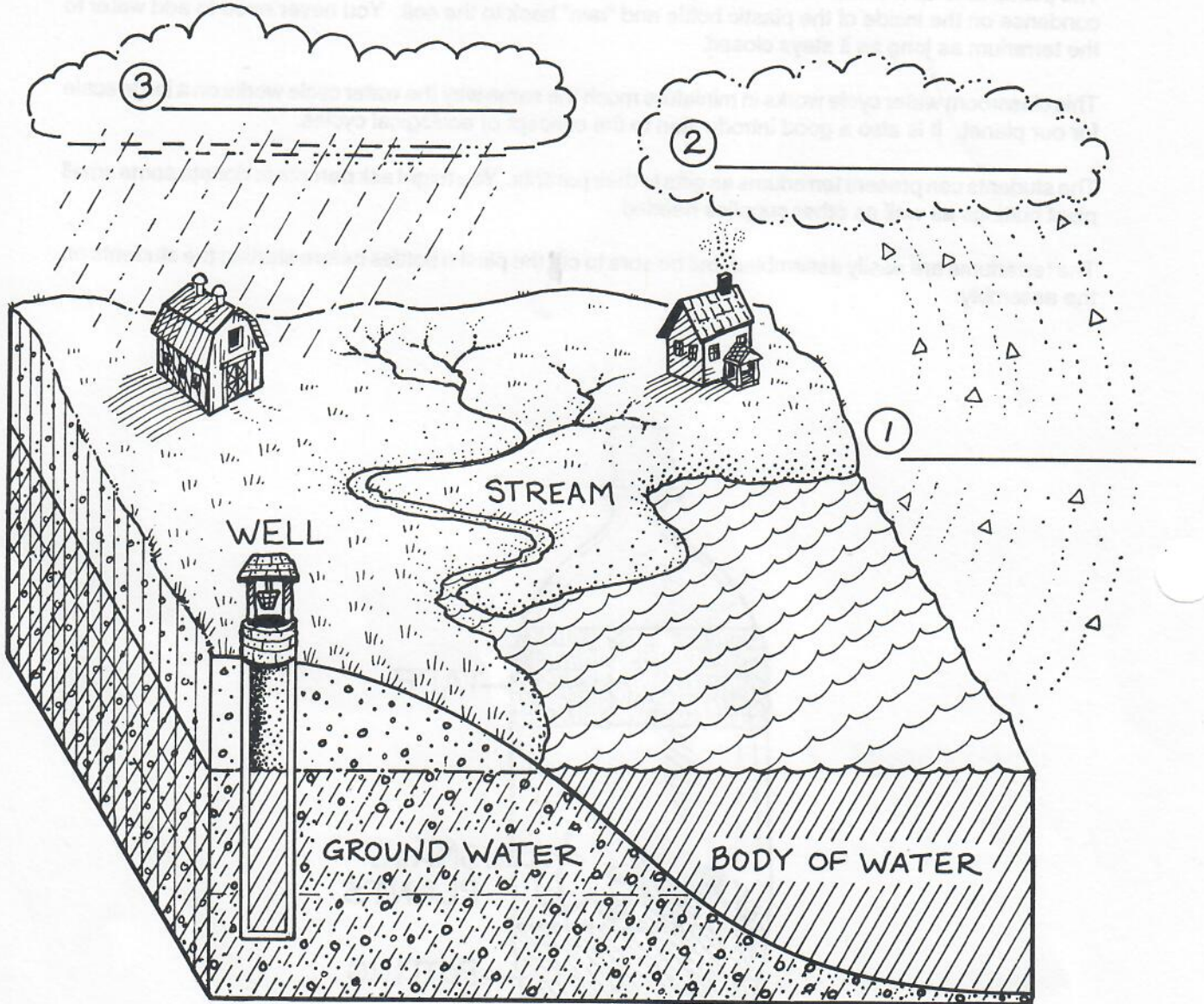
The students can present terrariums as gifts to their parents. You might ask parents to donate some small plant cuttings as well as other supplies needed.

The terrariums are easily assembled, but be sure to cut the plastic bottles before starting the students on the assembly.



THE RETURNING RAINDROP

Fill in the blanks to label the picture. Use the terms at the bottom.



Terms: water cycle
 evaporation
 condensation
 precipitation

4 _____

WATER CYCLE MATCHING

Match the definitions with the terms in the word bank below. Put the letter of the term in the blank.

- ___1. The change of water from a gas to a liquid.
- ___2. The process in which water becomes a vapor in the atmosphere.
- ___3. The method in which water continually moves from the earth to the atmosphere and back again.
- ___4. A resource needed by all the living things in an ecosystem.
- ___5. The gaseous state of water.
- ___6. The forms of condensed water vapor such as snow, rain or sleet.
- ___7. Water stored in the ground.

Word Bank:

- A. Condensation
- B. Water
- C. Water vapor
- D. Evaporation
- E. Water cycle
- F. Precipitation
- G. Groundwater