

## Objectives

Students will

- identify and describe three states of water; and
- observe and predict how water will change states.

## Materials

- water
- 1 electric tea kettle
- crushed ice (about 1/3 liter)
- funnel
- 1 plastic liter bottle
- 1 small plastic baggie
- 1 rubber band
- 1 black permanent marker
- 1 ruler
- white paper: 1 sheet per student
- crayons or colored pencils

## Procedures

- 1 To begin the lesson, fill an electric kettle with water and plug it in. Ask students to tell you what they think will happen when the kettle heats up. Have students watch the kettle as it heats, and ask them to tell you what they observe. Explain that steam is a form of water and that they are observing evaporation, the process by which a liquid becomes a gas. Write the words "steam" and "gas" on the board.
- 2 After watching the program, hold a class discussion about water. Ask students to tell you what they learned about water. Write their comments on the board for reinforcement.
- 3 Tell students that water has three states: liquid, solid, and gas. Show students the plastic liter bottle and tell them they will observe water changing into different states. Ask a volunteer to help you use the funnel to fill the bottle about one-third full with crushed ice. Have another volunteer help you place the baggie over the bottle top and seal it in place with a rubber band.
- 4 Have a student help you measure the level of ice in the bottle with a ruler. Move through this part quickly before the ice melts, and ask a few students to confirm the measurement. Make sure that the class agrees with the accuracy of the measurement, then ask a volunteer to help you draw a line on the bottle that indicates the level of ice. Write the words "ice" and "solid" next to this line.
- 5 Place the bottle in the sun or in a warm area of the classroom where students can observe it. Have students divide a sheet of paper in half. On the upper half, they will draw pictures predicting what they think will happen to the ice in the warmth. Encourage students who are able to write words or sentences that describe their pictures.
- 6 After about 30 minutes, ask students to look at the bottle and describe what they see. What has happened to the ice? What is happening in the bottle?
- 7 Ask volunteers to measure the water level. When the class is satisfied with the accuracy of the measurement, ask a volunteer to help you draw a line on the bottle that indicates the new water level. Write the words "water" and "liquid" next to this line.
- 8 Place the bottle in the warmth again and ask students to predict what they think will happen if the bottle stays there overnight. Have them draw pictures and, if able, write words or sentences on the lower half of the paper.
- 9 The following day have students observe the changes that occurred in the bottle. What has happened to the water level? Where did the water go? Point out the droplets of water that have formed in the baggie. How did the water get into the baggie?
- 10 Have students share their observations and talk about the accuracy of their predictions in a class

discussion. Talk about temperature and how it helps water change states. Ask students to tell you about the different forms of water and to describe how water changes from one state to another.

11. Students can also create tables and graphs to record their observations.

### **Adaptations**

For Grades 3-5

Instead of conducting the demonstration with a whole class, divide students into small groups. Give each group the materials needed to create their own demonstration (liter bottle, funnel, ice, marker, baggie, ruler). Have students write paragraphs describing their observations and predictions at each stage of the experiment.

### **Evaluation**

Use the following three-point rubric to evaluate students' work during this lesson.

- **Three points:** Students actively participated in class discussions; correctly identified and described three states of water; and observed and accurately predicted both stages of the demonstration.
- **Two points:** Students participated somewhat in class discussions; somewhat correctly identified and described three states of water; and observed and accurately predicted one of the demonstration.
- **One point:** Students did not participate in class discussions; did not identify and describe three states of water; and did not observe or accurately predict any stage of the demonstration.

### **Vocabulary**

**Evaporation** *Definition:* The process by which a liquid becomes a gas

*Context:* In the process of evaporation, heat from the sun causes some water from the ocean to turn into water vapor.

**Gas** *Definition:* An airlike substance that expands to fill any space available

*Definition:* Evaporated water becomes a gas.

**Liquid** *Definition:* A substance that flows freely but remains at a constant volume, such as water or oil

*Definition:* A liquid takes on the shape of its container.

**Solid** *Definition:* Firm and stable in shape *Definition:* Ice is water in its solid state.

**Temperature** *Definition:* The degree of heat present in a substance, object, or place

*Definition:* When the temperature plunges to 0° Celsius (32° Fahrenheit), water can become ice.

### **Credits**

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<http://school.discovery.com/lessonplans/programs/earthsecology/>