

# WHERE DID IT GO?



## BENCHMARKS AND TASKS

**SC.B.2.1.1** The student recognizes systems of matter and energy.

**SC.D.1.1.3** The student recognizes patterns in weather.

- The student measures the effects of energy from the sun upon air, land, and water by using a thermometer.
- The student measures the effects of energy from the sun resulting in water disappearing (evaporating) into the atmosphere.

## KEY QUESTION

What happens to the mass of a wet paper towel when it is left out for a long period of time?

## BACKGROUND INFORMATION

Evaporation is happening around us all of the time. Water evaporates from lakes, rivers, puddles, and the ocean. It evaporates from the bathtub after we bathe and from our skin when we sweat. Evaporation takes place when a liquid that's below its boiling point changes into a gas. When a liquid, like water, is warmed by the sun, or other heat source, some of the water molecules at the water's surface vibrate fast enough to escape into the surrounding air. These molecules form a vapor. The warmer the temperature, the faster the liquid will evaporate.

Wind also speeds up the evaporation process. Evaporation slows down and may stop when the air can no longer absorb molecules from the liquid. So on a very humid day a puddle will evaporate more slowly than on a less humid or dry day.

Evaporation is the process by which a liquid changes into a gas. When water evaporates, it changes to an invisible, odorless gas called water vapor. Changes in states of matter require a transfer of energy. Energy from the sun can cause this **evaporation**, as well as other heat sources (e.g., a light, a person's hand).

## MATERIALS

### Teacher

clock

### Per student

science journal

### Per group

balance

mass set

graduated cylinder

paper towel

water

*Where Did it Go?* worksheet

## TEACHING TIPS

1. This activity may take an entire day for the water to evaporate.
2. You may want to assign different students certain times to check the mass of the paper towel rather than disrupting the entire class.
3. If your balances have deep pans, you may want to put a paper plate on each pan (their masses will cancel out each other) in order to elevate the wet paper towel. This will allow more surface area to be exposed and increase the evaporation rate.

4. The paper towel should not be dampened to the dripping stage. All groups should use the same amount of water.

### ENGAGE

1. Place a small bowl of water at each table (enough to dip paintbrushes in several times). Give each student a paintbrush and a piece of drawing paper. Ask students to paint their names with their wet paintbrush and set aside.
2. While waiting for “paintings” to dry, have students wash their hands at the sink, but tell them **not** to dry them. Tell them to time how long it takes for their hands to dry. Ask them what things caused their hands to dry more rapidly...more slowly.
3. Wipe a damp cloth across the chalkboard. Draw a circle around the area. Have students observe what happens and discuss where the moisture may be going. Discuss that evaporation is taking place.
4. Have students check their “paintings”.  
Ask:  
*Can you still see your name? Why not?*  
*What has happened to the moisture?*  
Allow for discussion as students describe what has happened to the moisture.
5. Explain to students that they have just witnessed the **results** of evaporation, and that in this lesson we will explore the different rates of evaporation.

### EXPLORE

1. Put students in groups. Have one student from each group be responsible for distributing the materials for his/her group.
2. Go over directions for setting up the experiment. Determine as a class how much water to use to dampen the paper towel without bringing it to the dripping stage (about 10 ml). Determine as a class, the time interval that will be used between measurements. (You might want to start out with 30 minute intervals, and adjust if necessary.)
3. Have students predict what will happen to the mass of a wet paper towel if left on the balance over a period of time. Allow time for discussion about what variables might affect the evaporation. \*\*Predictions can be written in science journals. (optional)
4. First, have students level the balances. Place a paper plate on each pan. Then place a paper towel on one side of the balance. Add enough grams to the other side to create a balance. Record the mass of the dry paper towel.
5. Have students use the graduated cylinder to measure the predetermined amount of water. Then SLOWLY pour the water onto the paper towel. Add enough grams to again create a balance.
6. Have students record the starting time and the mass on the *Where Did it Go?* worksheet. (Note: There will be no “Difference in Mass” data collected for the first measurement.)
7. After the determined time interval, have students check the balances. (Balance should be lower on the mass side as paper towel begins to dry.) Have students remove a gram, one at a time until the balance is equalized. Record the new data on the *Where Did it Go?* worksheet.
8. Continue this procedure until the paper towel is dry.

## EXPLAIN

Discuss students' observations.

Ask:

*What happens to the mass of a paper towel when you wet it? (It becomes heavier)*

*How do you know this?*

*How many milliliters of water did you use to dampen the paper towel?*

*What was the starting mass of the wet paper towel?*

*What was the ending mass?*

*What was the difference in the two measurements?*

*What caused the difference?*

## EXTEND/APPLY

Ask:

*What variables do you think affected the rate of drying?*

*Where did the water go?*

*What is this process called? (evaporation)*

These questions and answers may be recorded in student science journals.

## EXTENSIONS

1. Ask students to think of other ideas they might try.

Ask:

*What would happen if we placed some of the balances outside on a windy day?*

*What if we placed some of the balances inside and some outside on a sunny day?*

*What if some of the paper towels were folded and some were opened?*

2. If students want to test different variables (e.g., outside; near a window; cloudy day; sunny day) have them share their strategies with the entire class so that all but their specific variable is held constant.
3. Discuss the process of **evaporation** in the **water cycle**. Be sure to mention the role of the sun's energy in the form of heat.

## ASSESSMENT

Teacher assessment through observation should include the following criteria:

- Tasks have been completed by the student.
- Student demonstrates ability to: calibrate a balance, read a balance to the nearest number and move grams on and off of balance to show a measurement of balanced weight.
- Student's journal entries should show growth and understanding.
- Student's answers to questions should show evidence of conceptual knowledge.
- Acquired vocabulary should appropriately demonstrate understanding.
- Student's questions should be probing, on task, or reflect the processing of an essential understanding.

