8. Humidity

OBJECTIVES: After completing this lesson, a student should be able to:

* Define HUMIDITY
* Identify things affected by humidity
* Use WET AND DRY BULB thermometers (Grades 4-8)

TEACHER BACKGROUND: *(Grades 1-8)*

Water boiling in a pot is releasing water vapor or moisture into the air. This increases the humidity of the air. HUMIDITY is the amount of water vapor in the air. The absolute amount of humidity in the air changes slowly, even though the number that you hear on the weather report changes almost hourly. That is because what you hear on the weather report is the relative humidity. RELATIVE HUMIDITY is the amount of water vapor the air holds only at one temperature. Relative humidity is often misunderstood and may seem confusing since it relates only to the current temperature and does not indicate the actual amount of water vapor in the air. Relative humidity changes signif-icantly with temperature changes from sunrise to sunset.

Additional notes for grades 4-8:
Warm air holds more moisture than cold air, so the relative humidity at a given temp-erature changes when the temperature changes. Let's compare two weather reports, one in the winter and one in the summer. In winter, you might hear that the temperature is 0 degrees C (32 degrees F) and the relative humidity is 50%. In the summer, you might hear the temperature is 21 degrees C (70 degrees F) and the relative humidity is 50%. Is the 50% relative humidity in the winter the same amount of moisture as the 50% relative humidity in the summer? No, because warm air that is half filled (50%) with moisture holds more water than cold air half filled with moisture.
Students can learn how to build an instrument that measures the amount of humidity in the air. The instrument uses two types of thermometers. WET BULB and DRY BULB THERMOMETERS measure humidity. The dry bulb thermometer is nothing more than a regular thermometer. The wet bulb has a piece of moist cloth around the bulb to measure evaporation of the moisture into the air.

To illustrate the role of evaporation on the wet bulb, recall how you feel cool after you step out of the bathtub or pool. Water on your skin is evaporating into the air and cooling your body. Stepping out of a pool or bathtub, you feel cool until the large water droplets have evaporated from your skin. The same principle applies to the wet bulb thermometer. If the air is dry, evaporation begins instantly and the wet bulb ther-mometer cools quickly. If the air is nearly saturated with moisture, evaporation is slow and the wet bulb temperature remains high.

Air flowing by the dry bulb thermometer does not change its temperature. But air flowing by the wet bulb thermometer evaporates the water on the wet bulb and cools the wet bulb temperature. After reading the dry and wet bulb thermometers, the difference between the two thermometer readings is used in a special table (see appendix) which tells the amount of moisture in the air (or relative humidity) at the present temperature.

Humidity Activity

GRADES 1-3

INTRODUCTORY: *WET WORDS*

You might start the discussion with a boiling pot of water or cloud pictures. Have students make a *picture dictionary,* drawing something that relates to moisture, A to Z. Do you think you can come up with a word for every letter? For example: atmosphere, boil, cloud, dew, evaporate, fog....etc.

ADVANCED: *WET HAND TEMP*

You'll need students wearing short sleeves for this activity. Have students dip one hand in comfortably warm water and hold it straight out in front of them. Have students hold their other dry hand outward and sense differences in temperature. Do both hands feel the same? (no) Which one feels cooler? (wet one) Why? (evaporation)

GRADES 4-8

INTRODUCTORY: *HAIR HUMIDITY*

Since hair length is affected by changes in humidity in the air, hang a strand of human (or horse) hair by taping one end against cardboard or wood and tying or taping a heavy object (such as a coin) to the bottom of the strand. Measure the strand and mark the board daily to see if it changes length from moist rainy days to dry sunny days.

ADVANCED: *OPPOSITE JARS*

Two jars can produce water droplets in different locations. Fill one dishwasher- safe jar half full with hot water and the other half full with ice water. Where do droplets form on each jar? (Vapor rising in the hot jar forms droplets on the jar *above* the water level. The ice water cools air near the lower part of its jar, and droplets form *below* the water level.)

MAKE A WET AND DRY BULB THERMOMETER (Time: 30 minutes) GRADES 4-8

Materials: 2 identical thermometers, an empty milk carton, water, shoelace, thread and rubber bands

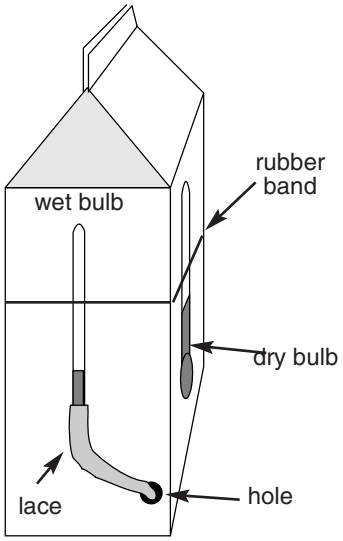
Preparation: Cut the lace and tie it to a thermometer bulb with thread. Dip bulb and lace in water. Mount thermometers on the sides of the milk carton with rubber bands, leaving at least 2.5 cm (1") at bottom. Cut a hole in carton near wet bulb and string the lace to the inside of carton. Pour water in carton to keep lace wet.

Procedure: Make sure the lace and wet bulb are damp. Fan the wet bulb.

Evaluation: After five minutes, calculate the difference between the wet bulb temperature and the dry bulb temperature. Use this difference plus the dry bulb reading with the relative humidity charts in the appendix.

Excursions: Does the relative humidity change at different times of the day? (yes) Do inside and outside readings match? (probably not)

Computer: Grades`` 4-8 students should take daily humidity readings, load them into the computer and record the data on their observation sheets.



WEATHERSCHOOL QUESTION:
TRUE OR FALSE? Humidity outside is generally the same as inside.
Obtain the answer tonight on your Weatherschool television channel!