

WEATHER

SECTION 5: DEW AND FROST

From *Hands on Science* by Linda Poore, 2003.



Westminster College

STANDARDS:

Students know solids, liquids and gases have different properties.

Students know how to use simple tools (e.g., thermometer, wind vane) to measure weather conditions and record changes from day to day and across the seasons.

Students will record observations and data with pictures, numbers, or written statements.

IN ADVANCE:

Get ice cubes. (at least 2 per student) Crushed ice works best.

KEY WORDS:

FROST: Forms when the temperature is 32°F or below and there is water vapor in the air.

DEW POINT: The temperature at which condensation occurs. In the morning the grass is cold and dew forms as the water vapor cannot remain a gas at cool temperatures.

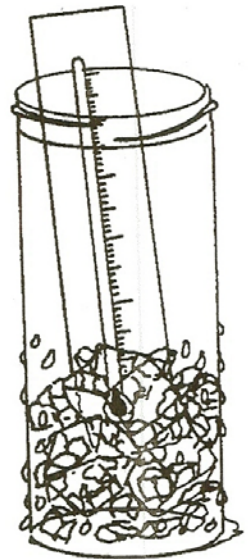
MATERIALS:

For Each Pair:

1 plastic, slim jar
thermometer
water
worksheet *Dew and Frost*
1 sandwich bag

For the Teacher:

ice cubes or crushed ice
salt
ice chest
blocks
to crush the ice



EXPLORE:

MAKING DEW AND FROST

1. WHAT IS DEW?

Take the students outside on a cool morning and look at the leaves or grass. What are the water drops called? (dew)
Look at the same leaves later in the day. What happened to the dew? (Water evaporated because it is warmer and warm air holds more water vapor.)

If it is a cold morning, have the students exhale and see their breath condenses as it cools. Have students hold a hand in front of their mouth to feel the hot, moist air they exhale.

2. **LET'S MAKE DEW**

Pass out a plastic jar with 1" of water to each pair.

Have the students exhale on the side of the cool jar.

Does the water vapor in their breath condense on the jar? (yes)

What happens next? (It evaporates in the warm classroom.)

3. **WHAT IS THE TEMPERATURE OF THE WATER?**

Pass out thermometers and worksheets, *Dew and Frost*.

Have students: Put the thermometer in the water.

Read the thermometer after one minute.

Color the column red on their worksheet to match the temperature.

(Observe their ability to read the thermometer and record accurately.)

4. **HOW COLD IS ICE WATER? OBSERVING DEW FORM**

Give each pair of students 3 ice cubes in a sandwich bag.

Crush the ice with a wood block or old book.

(Crushed ice and water get cold faster than ice cubes.)

Add ice to each jar. Feel how cold the ice water is.

Measure the temperature of the ice water with a thermometer. Place the thermometer against the side of the jar, facing out for easy reading.

5. **WHAT IS THE TEMPERATURE WHEN DEW FORMS?
FINDING THE DEW POINT**

Have students: Observe the thermometer and the jar. When the outside of the jar gets foggy, read the thermometer and color in the thermometer for the dew point on the *Dew and Frost* worksheet. Draw their initial in the dew on the jar to feel the moisture. (Tip the jar to see the 'dew' better.)

6. **WHAT DOES SALT DO TO THE ICE WATER?**

Add 2 tablespoons of salt and 2 crushed ice cubes to each jar. Salt will reduce the freezing point, making the water go below 32°F and making the jar cold enough to form frost.

Remove the thermometer and screw the lid on the jar.

Have students shake and swirl the salt-ice mixture for 3 minutes, holding the jar by the lid. Place the jar on a desk. Observe for several minutes. Do not touch the jar with warm fingers until frost forms!

7. **OBSERVING FROST
WHEN DOES FROST FORM?**

When frost forms on the outside of the jar, have the students scrape the jar with a fingernail to rub off some frost. Observe. Place a thermometer in the

ice water. Wait a minute. What is the temperature? Color the frost thermometer on the worksheet to record temperature.

8. Have students feel how cold the salt-ice water is.
Although frost begins forming at 32°F, the water becomes colder as salt water has a lower freezing point than water. More salt and more crushed ice added to the water will cause frost to form much faster. If no one gets frost, add a lot of crushed ice and salt to one student's jar, put on the lid, and let that student report when frost forms. Measure the temperature when frost forms. Pass the jar around for all students to see the frost.
9. **WHERE DID THE DEW AND FROST COME FROM?**
Discuss. The air has water in it in the form of a gas. (water vapor)
When the air gets cold, the gas turns back to water. This happens when you take a hot shower. Where does the steam condense and change back to a gas? (on the cold mirror) When do you see frost outside? (below 32°F)