Science Unit: ***Weather and Seasons***

Lesson 8: ***Temperature, Wind, Frost, and Dew***

School Year:	2010/2011
Developed for:	McBride Elementary School, Vancouver School District
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Grade level:	Presented to grades K and 1; appropriate for grades K – 5 with age appropriate modifications
Duration of lesson:	1 hour and 20 minutes

Objectives

1. Gain experience in reading a thermometer.
2. Learn how weather measurements are made (temperature and wind direction), and connect this to the statistics given on the familiar weather report.
3. Discover how frost and dew are formed.

Background Information

Students hear weather reports frequently, yet the language used is not too accessible for younger children. Through making their own weather measurements students would have a personal connection to, and more understanding of, these reports.

Vocabulary

temperature	a numerical measure of how hot or cold something is
wind vane	a device to measure wind direction
frost	ice crystals formed when water in the air freezes on a surface
dew	water drops formed when water in the air condenses on a surface

Materials

- large model of a thermometer
- chart of local temperature through the year
- tin can (e.g. soup can), washed and label removed
- ice, about 1 small bag
- salt, one box
- thermometers, one for each student pair. We re-labeled the thermometer scale to count in units of 5, by taping over with masking tape and writing in new numbers.
- washers or pennies, 2 per student
- tape, 2 pieces per student
- pen cap, or small tube, one per student

- water
- triangle of cardboard for each student. Cereal box cardboard works well. The triangles sides should be about 9cm, 4cm and 10cm.
- wooden skewer, one per student

In the Classroom

Introductory Discussion:

Ask students what the weather is outside. Prompt for comments that relate to the activities to follow: Is it cold or warm? Is it windy?

The weather report on the television or radio does not just tell us whether it is hot or windy. They give us more information, such as what the temperature is, and which way the wind is coming from. Today we will be taking our own weather measurements.

Brief description of science activities:

- Temperature: measure the temperature of inside air, outside air, and iced water.
- Make a wind vane to measure wind direction.
- Make frost and dew and learn where they come from.

Brief description of the processes of science that the students will focus on: observations, recording data, making inferences.

Safety guidelines: the pointed sticks used to make the wind vane are sharp. Students using these outside should not run with them.

Science Activities

(1) Activity Title: Measuring temperature

Purpose of Activity: Learn how to use a thermometer, and to relate the readings to how the temperature feels.

Methods and Instructions:

Set-up prior to experiment: a tin can containing 10cm water, for each pair of students

Students work in pairs.

1. Start with a class explanation of temperature: The temperature tells us how hot or cold something is. Using this model of a thermometer, when the red is high, the number reading is higher and it is warmer. When the red line is lower, the number reads lower and it feels colder. Show a a temperature chart of Vancouver and show that we can see what happens to the temperature through the year. In the winter the temperature is lower, as it is colder. In summer the temperature is higher, as it is warmer. This chart was made using a thermometer.
2. Show students the thermometers they will be using to measure temperature, and use the large model thermometer to show them how to read their thermometer. Show them that the temperature is level with the top of the red line. Show them to put the bulb of the thermometer in the place that they want to measure the temperature (so if they hold onto the bulb they will be measuring the temperature of their fingers, not the air).

3. At their desks, students read their thermometers to measure the air temperature in the classroom. If the class is going outside later for other activities, the outside air temperature can be measured then. If not, go outside and measure the outside air temperature. Is it lower or higher than the inside air temperature?
4. In the classroom, ask students what will happen if we put the thermometer in something colder. (The red line will go down, and read a lower number). Ask students how we can make their can of water colder. (Add ice). Add ice to the cans of water. Tell the students that by adding salt we can make the water even colder. Ask students to put their thermometers in the cans of iced, salted water while watching the red line on the thermometer. The students should see the red line drop to 0 degrees C, or lower. Tell the students that in the winter, the air temperature can be 0 degrees C, or lower.

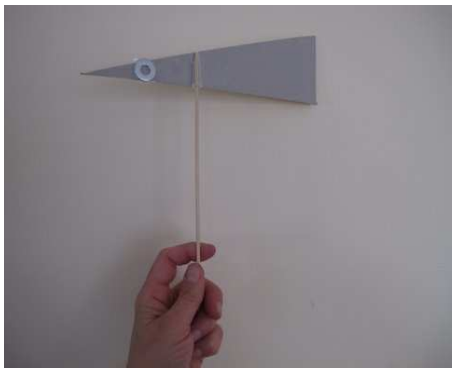
(2) Activity Title: Wind vanes

Purpose of Activity: Make wind vanes, and use them to measure the wind direction.

Methods and Instructions:

Students work individually.

1. Discuss what wind is and what it does. (Wind is moving air. It comes from different directions and brings us different weather. Wind is measured by how fast it is moving, and where it comes from). Tell students that we will make our own wind vane to find out which direction the wind is coming from.
2. Make the wind vane as follows (simplified from ref 1, see below). Each student tapes 2 washers/pennies near to the longest pointed corner of their cardboard triangle. They should be as near to the corner as possible, without overlapping the edge of the cardboard. This will give weight to the wind vane and stabilize which way it is pointing. Balance the cardboard over your finger to find the balance line (about half way along the triangle, but slightly nearer to the weighted corner). Tape a pen cap (or tiny tube) at the balance point with the open end facing the outer edge of the cardboard. Insert the pointed end of a wooden skewer into the pen cap, so that the wind vane can swing freely.



3. Take the students outside to an open area, so that they can measure the wind direction with their wind vanes. Tell them which way is North, South, East and West, and ask them which way the wind is coming from. The students need to hold their wind vanes high away from their bodies to catch the wind, and keep the wooden skewer vertical, so that the cardboard blade can swing freely.
4. If this activity is done following activity 1, the outside air temperature can be measured at this time too.

(3) Activity Title: Frost and dew

Purpose of Activity: Make frost and dew and understand how it forms.

Methods and Instructions:

Set-up prior to experiment: Metal cans containing a little water, lots of ice to fill each can, and salt (2 tablespoons per can). They need 30 mins sitting time before this activity. The cans set up in activity 1 can be used for this - just leave them untouched in the middle of the desks after the thermometer readings are taken.

Students work individually.

1. Students are asked to look at the cans to see what has formed on the outside of them. They should see ice at the bottom of the can (next to the melted salted water inside the can), and water droplets at the top of the can.
2. Ask where the ice and water came from, then fill in to explain: There is water in the air. When it is cold it turns to a liquid and makes water drops (as it has at the top of the outside of the can). Show a picture of dew on grass - the grass has water drops on it even though it has not been raining. The dew is from the water from the air which has cooled and left the water droplets. When it is very cold, the water in the air freezes into ice (as it has at the bottom of the outside of the can). This happens outside too: show a picture of frost.

Closure Discussion

Next time you watch or hear the weather report, you will know how weather scientists measured the temperature (with a thermometer) and how they knew the wind direction (with a wind vane, or other wind-direction and wind-speed device).

References

1. Woodward, John. 2006. Weather Watcher. pp. 20, 21. DK Nature Activities series. (Used for the wind vane activity).
2. Levine, Shar and Johnstone, Leslie. 2003. Wonderful Weather. First Science Experiment Series. sterling Publishing. (Used for the frost activity).