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Lesson 1: Make a Weather Station

Overview

Meteorology is the study of all changes in the atmosphere, i.e. the layers of gases (air) that surround the earth. In this lesson, students will design and build some of the same instruments that meteorologists use and make a *Weather Learning log* to record their answers. This log will be an important tool because they will use it to record all of their data and information as the students complete their activities.

Objectives

Students will be able to:

- describe weather and relate how weather affects their daily lives;
- observe and record weather-related data;
- construct instruments for measuring weather; &
- explain and demonstrate how each instrument is used to measure weather.

Time

Approximately three hours spread over a one week period.

(This will depend on your grade level and ability level of your students. If time is short, each group can build an instrument; see Part 2: Step 1).

Materials

- *Weather Learning Log* or [Student Worksheet](#)
- Directions and materials for each instrument
NOTE: sufficient directions and materials for one per group
 - [thermometer](#), [wind vane](#), [anemometer](#), [rain gauge](#), and [barometer](#)
- Inexpensive outdoor thermometers (the thermometer that students will construct will not be accurate enough to measure temperature).
- Weather related-topics:
 - [USA Today: Guide to the science of the atmosphere](#)

Teacher Preparation

- LIMITED ACCESS: For this activity, computer / Internet access is not required however every student or pair of students will need to access the Internet for the next activity (Activity 2). Therefore, if you do not have access to a computer lab or place with at least one computer for every two students, it is highly recommended to combine the first two activities (Activity 1 and Activity 2). For a full description of one way to combine both activities, see the note for [Combining Activities 1 & 2](#) below.
- METHODOLOGY: For this activity, it is recommended that you assign the students to work in small groups to design and construct weather instruments with each student having specific tasks assuring that each team member has a role.
- Weather related-topics:
 - [USA Today: Guide to the science of the atmosphere](#)

Procedure

Part 1: Introduction

Before introducing the weather equipment to students, read all directions accompanying the equipment, perform test runs prior to using them with your students, and select an area inside the classroom to store the barometer and an area outside to install the rain gauge (both must be installed at level positions) and use the thermometer (where it is not exposed to direct sunlight), wind vane, and anemometer. The materials needed for the construction of the weather equipment are listed on the corresponding pages for each of the instruments.

- 1. Make a Weather Learning Log:** Begin by leading a brief class discussion with the students on how weather affects their daily lives considering such factors as the kinds of clothes they wear and the outdoor activities that they can do. Optionally, you can use the first one or two questions from *Step 2* (i.e. What do they think of when they hear the word "weather"?, etc.). This will get them thinking about weather.
 - Have students take out their journal. Students can either complete a *Weather Learning Log* individually or in small groups (this will depend on your objectives).
- 2. Discuss and answer the following questions:** After a brief discussion, divide students into groups and ask them to discuss and answer the questions.
- 3. Brainstorm:** Once the students have answered the questions, they should move on to the next step and try to brainstorm designs for instruments.
- 4. Present:** Once the groups have brainstormed designs for their instruments AND answered the questions, gather the groups to report on their ideas. The groups will come up with different solutions to the problem that was posed (for example a group might decide to hold a long paper streamer straight up in the air and the direction that it points will tell them something about wind direction). After allowing time for reports, tell them that, although their ways are good and that they will have time to try out their ideas, you are going to show them how to make the instruments that they will be using in this unit.
 - *Sky Conditions:* It is important to decide on a standardized way to report sky conditions. The class should come to a consensus as to the words (cloudy, partly cloudy, overcast, etc.) they should use to identify skies that are not clear and you should post these on the classroom wall.

Combining Activities 1 & 2:

While Internet / computer access is not required for this activity, it is recommended that every student or pair of students access the weather web site used in the next activity (Activity 2) so that they learn how to collect weather data from the Internet. One way to do this if you do not have access to a computer lab is to *Combine Activities 1 & 2* by asking students or pairs of students from each group as they are making their weather instruments to individually go to the computers in your classroom and complete the Internet data collection section of Activity 2 (i.e. *Part 2: Use the Internet to observe weather*). Students can then add their weather observations collected from their instruments directly to the Current Conditions table and complete *Part 3: Analyze the Data* after all of the weather instruments have been made.

Part 2: Make a Class Weather Station

- 1. Build the Weather Instruments:** It is recommended that each of the groups build all five weather instruments so that they have a thorough understanding of each of the common tools that meteorologists use. By collecting their own data, the students will learn more about weather through a process similar to the one that professional meteorologists use.

- After completing their instruments, each group should store them in a box and take their thermometer, anemometer, wind vane, and rain gauge outside with them each day since it would be impractical for the students to leave their instruments outside for the duration of the unit.
 - **TIME:** If time does not permit each group to make their own instruments, you can assign each group an instrument. In this case, if you have more than 5 groups, you can elect to have the additional groups make the same instrument. Once completed, all of the instruments could then be put together to create a class weather station.
2. **Practice:** to assure accuracy in equipment use, encourage the groups to repeat their tests and calculate average results.
 3. **Record your measurements:** Once the groups have repeated the tests, they should record their measurements in their Weather Learning Log or their Student Worksheet. If you are combining Activities 1 & 2, students can record their measurements directly to the Current Conditions table.

Homework: Students can either answer the questions when they complete this activity or as an optional homework assignment. If you opt for the students to complete the questions as a homework assignment, please note that Internet access will be required to complete numbers 3 & 4.

- If only one or a few of the students in each of the group has access to the Internet at home, library, etc., you can either print and distribute the satellite maps or ask a member from each group to print and share the satellite maps with the other group members.

Assessment Suggestions

Make each student or cooperative group responsible for the the answers to the questions and the accuracy of the instruments that they build.

Student Activity

NOTE: The following instructions also appear in [Student Activities](#).

Activity 1: Make a Weather Station

Part 1: Introduction

1. **Make a Weather Learning Log:** This log will be an important tool. You will use it to record weather information as time goes on.
 - a. Write your name on the notebook (if you are working as a group, each member should put their name on it). As an optional activity, you can decorate the cover as well.
2. **Discuss and answer the following questions.** Record your answers in your Journal.
 - a. What do you think of when you hear the word "weather"?
 - b. How does weather affect our daily lives? (Ex. what kinds of clothes do you wear, outdoor activities that you do, etc.)
 - c. What kinds of things would you look for if you wanted to describe the weather of a particular day to someone else?
 - d. What kinds of information are important to collect?

3. **Brainstorm** designs for instruments that you could use to measure each of the following AND answer the corresponding questions in your Journal:
 - a. Temperature: What does temperature have to do with weather?
 - b. Wind: How can you describe wind? Are there different types of wind? Can you measure how fast the wind is blowing and where its blowing to?
 - c. Precipitation: Are there different types of precipitation?; How could rain be measured?
 - d. Air pressure: What is air pressure? Why should we measure it? What does air pressure have to do with weather?
 - e. Sky conditions: Write a list of standardized terms to describe sky conditions (e.g. clear, partly cloudy, overcast with openings, overcast, etc.)
4. **Present:** Each group should first design the class weather instruments.
 - o Additionally, the class should develop a list of standardized sky condition terms to use for the rest of this project.

Part 2: Make a Class Weather Station

1. **Build** the following weather instruments in the order below. Directions are provided for each.
 - A. **Barometer** (Air pressure)
 - B. **Rain Gauge** (Precipitation)
 - C. **Thermometer** (Temperature)
 - D. **Wind Vane** (Wind Direction)
 - E. **Anemometer** (Wind Speed)
2. **Practice with the Instruments:** repeatedly test the instruments for accuracy.
3. **Record your measurements:** Please follow the guidelines below.

NOTE: If you are combining Activities 1 and 2, record your measurements in the column marked "Class Instruments" in the Current Conditions table.

 1. Temperature (Use a commercial outdoor thermometer and record in degrees Celsius):
 2. Sky conditions (Observe outside and use one of the standardized sky condition terms. For example, clear, partly cloudy, overcast with openings, overcast, etc.):
 3. Wind (calm, light, etc.):
 4. Wind Direction (N, NW, W, SW, etc.):
 5. Wind Speed (how many times the anemometer spun):
 6. Precipitation Type (at data collection time - rain, drizzle, snow, none, etc.):
 7. Precipitation Amount (in last 24 hours. Record your findings in mm):
 8. Air Pressure (record your finding in the units marked on your class barometer):

Homework (*optional*)

1. Do you think the weather instruments you made are as accurate as those used by professional meteorologists? Why or why not?
2. How could you make them more accurate?
3. If you have Internet access, select and print a [satellite maps](#) ([back-up](#)) where your country is located and answer the questions below:
4. Questions:

- What do you see in the map?
- Do the current weather conditions in your city match up to what you see on the satellite map?
- How could you use a satellite map to predict weather?

Related Links
<ul style="list-style-type: none">● Weather Glossary● Miami Museum of Science: Make a Weather Station

- [Weather Glossary](#)
- [Miami Museum of Science: Make a Weather Station](#)

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