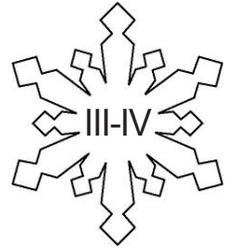


Weather Instruments

Levels



Grades 5-8

Overview:

The weather instruments scientists use today to measure temperature, air pressure, rainfall, and other weather did not always exist. Before those instruments were created, people used observations of the world and other measuring devices to record and predict weather. In this activity, students research common weather instruments to learn what they do, when they were invented, and by whom. Then, they interview a Native Elder to find out traditional ways of measuring weather.

Objectives:

The student will:

- learn the origin and use of common weather instruments;
- perform research using the *Global Climate* DVD and/or Internet; and
- compare scientists' methods of collecting weather data to that of Native Elders'.

GLEs Addressed:

Science

- [5-8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [5] SG4.1 The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by investigating that scientists' curiosity led to advancements in science.

Materials:

- *Global Climate* DVD
- TEACHER INFORMATION SHEET: "Weather Instruments"
- STUDENT WORKSHEET: "Weather Instruments"

Activity Preparation:

Invite a Native Elder to the classroom. Formulate and write down questions to ask in regards to measuring weather, such as rain, wind speed, or temperature. What signals are there that it is going to rain or that the temperature has gone up or down?

Activity Procedure:

1. Introduce the Native Elder visiting your class. Explain to students that they are going to learn about cultural ways of recording and predicting weather; then later, compare those methods to the ones scientists use. Remind students to listen quietly and not interrupt. They should wait until they are called on to ask the questions they previously prepared.
2. After the Elder is done speaking, thank them for participating and continue with the activity.
3. Explain that during this portion, students will explore the *Global Climate* DVD and/or Internet to determine the function of various weather instruments, who created them, and when they were created.
4. Hand out the STUDENT WORKSHEET: "Weather Instruments" and instruct students to begin.
Note: This activity also may be done in small groups or as a whole class activity by displaying the *Global Climate* DVD on a whiteboard or screen using a projector.

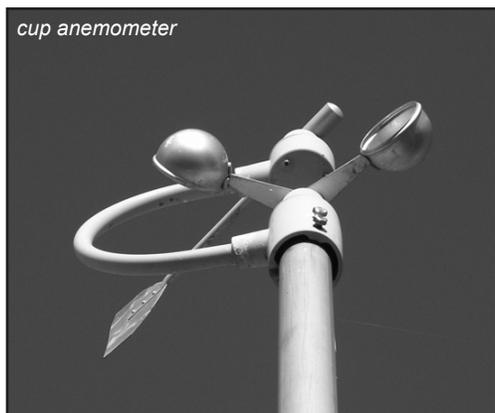
5. Be sure to create a thank you note or gift for the visiting Elder. This may be done individually or as a class. Encourage creativity.

Answers:

1. b
2. a
3. b
4. b
5. b
6. Answers will vary.

Weather Instruments

Teacher Information Sheet



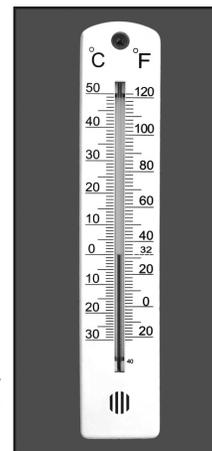
Anemometer – An anemometer measures the speed of the wind. The most familiar type of anemometer is the cup anemometer, invented by Dr. John Thomas Romney Robinson in 1846.

Thermometer – A thermometer measures temperature. There are many different types of thermometers. Galileo often is credited with inventing the thermometer, but actually he created a thermoscope, a device that could measure the change in temperature (up or down) but not the temperature itself. Santorio Santorio made the first actual thermometer in 1612, but it was not very accurate. The first liquid-in-glass thermometer, the one typically thought of today, was invented and produced in 1654 by the Grand Duke of Tuscany, Ferdinand II. Gabriel Fahrenheit created the mercury thermometer, which many people use today, in 1714.

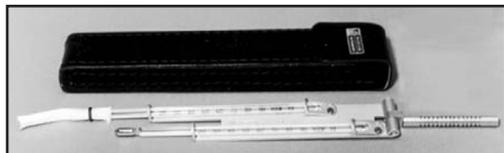


Fahrenheit also created the Fahrenheit scale for measuring temperature, which is still used today. Anders Celsius devised the Celsius scale in 1742.

Shown at left, a Galileo thermometer; at right, a modern mercury thermometer.



Hygrometer/Psychrometer – A hygrometer or psychrometer is a device used to measure humidity. One type of hygrometer is a sling psychrometer. A sling psychrometer has two thermometers (one with a wet bulb and one dry) attached to a handle or length of rope. The sling psychrometer measures by being spun around in the air for a few minutes. The changes between the wet bulb and dry bulb indicate humidity.



Above, a sling psychrometer.

Barometer – A barometer measures air pressure. There are several types of barometers, some use water to measure air pressure and others use mercury. An aneroid barometer uses an aneroid cell that measures by expanding and contracting in reaction to small air pressure changes. Evangelista Torricelli, a student of Galileo Galilei, devised the first barometer of this type in 1643.

Torricelli had set out to create a perfect vacuum and an instrument to measure air pressure. He succeeded in creating a vacuum in the top of a tube of mercury. Torricelli also noticed that the level



Above, a sailor's barometer; right, a close-up photo showing the barometer dial.



of the fluid in the tube changed slightly each day and concluded this was due to changing pressure in the atmosphere. He wrote: "We live submerged at the bottom of an ocean of elementary air, which is known by incontestable experiments to have weight."



Above, a tipping bucket rain gauge.

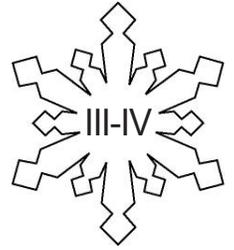
Rain Gauge – A rain gauge is used to measure precipitation, or the amount of liquid (including snow and sleet) that falls in a certain period of time. Rain gauges can only indicate rainfall in a local area. They make use of bucket, graduate cylinders, and other capturing devices. The world's first rain gauge is said to have been developed in 1441 by Jang Young Sil, under the order of King Se Jong. A standardized rain gauge was sent to every village in Korea to be used as an official means of measuring a farm's potential for harvest.

Name: _____

Weather Instruments

Student Worksheet

Levels



Directions: Using the *Global Climate* DVD and/or the Internet answer the following questions.

1. What instrument is used to measure rain?
 - a. bucket
 - b. rain gauge
 - c. barometer

2. What instrument is used to measure humidity?
 - a. hygrometer
 - b. humidifier
 - c. barometer

3. What instrument is used to measure wind speed?
 - a. barometer
 - b. anemometer
 - c. rain gauge

4. The first thermometer was invented by
 - a. Galileo
 - b. Santorio
 - c. Celsius

5. The rain gauge was first used in
 - a. Italy
 - b. Korea
 - c. United States

6. How do Elders in your community measure weather?
