Charting Seasonal

Edible Schoolyard Pittsburgh

Fall

GROW PITTSBURGH

MATERIALS

- A watch or other time piece
- Copies of the daily sunrise/sunset time
- Chart paper
- Markers
- Yardsticks
- Garden journals and pencils

PREPARATION

- A day before this lesson, assure that the max/min thermometer is in a secure and accessible spot in the garden.
- Assure the sun pole is installed in the garden, 3' tall.
- Print out multiple copies of today's online forecast. Make sure sunrise and sunset times are included in the forecast. Alternately, you can use the weather section of today's newspaper.
- Set up dry erase board or flip chart in the outdoor classroom.

PROCEDURE

Taking Measurements

- Lead the group to the max/min thermometer. Introduce the group to the thermometer and show students how to accurately read it. Then, have students take turns reading it. As they cycle through, have each student record the reading in their journals. EXTENSION: Have students calculate the average of the maximum and the minimum temperatures for the day and use this average for the graphing activity below.
- Lead the group from the thermometer station to the sun pole. Introduce the group to the sun pole and explain that by measuring the length of its shadow at the same time of day over a period of time, we will begin to notice some changes. Have a student volunteer measure the length of the shadow from the base of the pole to the tip of the shadow the pole creates. Students should record this measurement and the precise time in their journals.
- Lead the students back to the outdoor classroom. Show the group how to calculate the day length using sunrise/sunset times (use example figures for this exercise). Then, pass out a copy of the weather forecast and have them record today's sunrise/sunset times. Ask students to work together to determine today's day length by calculating the number of hours/minutes between sunrise and sunset. Have students record their answers in their garden journals.

Graphing Measurements

- As a class, create three graphs on one piece of chart paper. The first displays temperature, the second, day length, and the third, the length of the shadow on the sun pole. To create the graphs, list days at the bottom on the x-axis. Leave room for about 5 dates. For the temperature graph, list the degrees on the y-axis, from 25 to 75. For the day length graph, list hours, from 0 to 15, at 20 minute intervals. For the sun pole shadow graph, label feet, from 0 to 15, at 4 inch intervals.

Measurement

Nature of Science

ENGAGE

Prep: Create three "mystery boxes." Inside one of the boxes (or bags), place a slip of paper with the temperature and date. Inside the second box, place a slip of paper with a picture of a pole and its shadow, with the shadow length in inches and the time of day indicated. Inside the final box, place a slip of paper that shows the day's length in hours and minutes. Activity: Divide students into three groups and give each a different "mystery box." Ask them to discuss and make a guess: *What does this data have to do with seasonal change?* Have each group report their guess to the class.

OBJECTIVES

Students will be able to…

- Identify and describe seasonal patterns, including changes in temperature, sun angle, and day length
- Relate the changes in sun angle and day length to changes in temperature
- Predict future temperatures based on observable seasonal patterns

EXPLAIN

Predicting Temperature Change

All plants have a range of temperatures in which will they thrive. Some can tolerate a wide range of temperatures, while others might require consistently hot or cool weather. When the temperature dips below freezing, some plants may not survive. If we can predict when freezing temperatures will arrive, we can let our plants mature fully while still harvesting them before they are killed by the frost.

Day Length

The length of a day has some effect on seasonal temperature change. From the summer solstice (June 21) to the winter solstice (December 21) the days grow shorter. From the winter solstice to the summer solstice the days grow longer. When the days are long, the sun has more time to heat up the earth, and average temperatures begin to rise.

Sun Angle

While day length does have some effect on seasonal temperature change, the primary reason why temperatures change seasonally is due to the angle of the sun in the sky. At noon on the summer solstice (June 21), the sun is at the highest point in the sky that it will be all year. Its direct rays heat up the earth very quickly. If we measure the height of the sun in the sky every day at noon from the summer solstice onward, we will notice it getting lower and lower until it reaches its lowest point on December 21, the winter solstice. At this point, the sun's rays are hitting the earth at a sharp angle and do not heat it up very quickly.

We use a sun pole to measure how high the sun is in the sky. When the shadows are long, the sun is low in the sky. When the shadows are short, the sun is high in the sky. For a virtual representation of the angle of the sun in the sky visit http://www.esrl.noaa.gov/gmd/grad/solcalc/

ADDITIONAL CONTENT INTEGRATION *(see previous page)*

Graphing activity on page one.

ADDITIONAL MATERIALS

- Mystery boxes
- Copies from Farmer's Almanac

EVALUATE

Journal prompt: Give each student a copy of the regional weather forecast from the Farmer's Almanac. Ask them to locate the predicted average temperature for the current month. Record this prediction on the board. You may also want to note and discuss the accuracy of the weather prediction for the week. *What are your predictions about next month's average temperature?* Have students record their response in garden journals.