4-H Grab and Go:
Design and Build a Barometer

Concept:
Air pressure is used to predict weather.

Age Level:
Middle School: Grades 5—8

Education Standard:
NSES: Earth and Space Science; Changes in the Earth and Sky.

SET Ability:
Design and Build, Measure, Observe

Life Skill:
Problem solving, Critical thinking

Success Indicator:
Youth will design a barometer and explain how and why it works.

National 4-H Curriculum:
The Power of the Wind (www.4-H.org/curriculum/wind)

PREPARATION

Time: 10 minutes

Space: Tables

Materials:
- Big glass jar or beaker
- Small glass jar
- 2 balloons (1 large and 1 small)
- Tape
- Straw
- Rubber bands
- Pen or Marker
- Scissors

Background Information:

Meteorologists know the importance of understanding air pressure when predicting weather. A barometer is an instrument used to measure the change in air pressure. Changes in air pressure cause wind and affect the weather. You can find some general statements about weather forecasting using wind and barometers at:

http://www.usatoday.com/weather/wfbarrow.htm

There are lots of different kinds of barometers. All of them work in the same general way. They rely on air pressure to indicate a change. You can illustrate how a barometer works.

Instructions:

1. Cut each of the balloons so they will stretch flat across the top of the glass jars; one across the big jar and one across the small jar.
2. After you stretch the small balloon over the opening of the small jar, use a rubber band to hold the balloon in place.
3. Cut the straw to fit inside the large jar without touching the sides of the jar and attach it to the top of the balloon stretched over the small jar with the transparent tape.

Support for this resource was provided by the 3M Foundation.

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YOUTH DEVELOPMENT TIP

Encourage independent construction and data collection and group comparison of results to determine how a barometer works (fosters independence and teamwork).

QUESTIONS

- Look at different types of barometers. How are they alike? How are they different?
- How do meteorologists use barometers to predict weather?

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When you cover the jar with the balloon, you capture the current air pressure inside the jar. This pressure stays constant. When air pressure outside the jar changes it pushed on the balloon which moves the straw either up or down. When you push down on the large jar's balloon you increase air pressure which pushes the small balloon down and cause the straw to rise. When you pull up on the large jar's balloon you decreased air pressure which cause the small balloon to rise and lowers the straw.

Find more information about barometers at: http://www.wikihow.com/Make-a-Simple-Weather-Barometer

4. Put the small jar, with the straw attached, inside the big jar.
5. Stretch the large balloon over the large jar and hold it in place with another rubber band.
6. Measure the position of the straw, and mark it with a pen on the outside of the jar.
7. Press down on the big jar's balloon and observe what happens to the top of the small jar. Mark the new position of the straw.

Be sure to stretch the balloons tightly over each jar.

8. Pull up on the big jar's balloon and observe what happens to the top of the small jar. Mark the new position of the straw.

Extend:

You can create your own barometer using just one jar. Use a piece of paper to mark the changing position of the straw on several days and note the weather each day. (Try to take the readings each day when the temperature is the same as temperature changes can also affect the position of the straw.)

To predict your local weather, use your barometer and the general statements given at:

http://www.usatoday.com/weather/resources/basics/wworks0.htm

1. How does your barometer work?
2. How accurate were your local weather predictions?
3. Think of an experiment that could test the accuracy of your barometer and your local weather predictions. Explain that experiment.