



4-H Grab and Go: Measuring Wind Speed

Concept:

There are a variety of tools that can be used to measure wind speed.

Age Level:

Middle School: Grades 5-8

Education Standard:

NSES – Physical Science, History and Nature of Science

SET Ability:

Build, Use Tools

Life Skill:

Acquiring and evaluating information

Success Indicator:

Youth will be able to make an anemometer and use it to measure wind speed. They will be able to compare measurements to published wind speeds.

National 4-H Curriculum:

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

PREPARATION

Time: 10 minutes

Space: Tables, access to electricity for fans

Materials:

- 6-inch plastic protractor for each participant with a hole in the center at 0°
- Ping-pong ball for each participant
- Dark thread or fishing line
- Tape or glue
- Pens
- Fans (if you cannot go out in the wind)

Background Information:

You can observe wind speed affecting flags and trees and other objects around you, and you know that when the wind is blowing hard, tree branches move more and flags extend. In the early 1800's Admiral Sir Francis Beaufort developed a scale for observing sails on ships to estimate wind speed. Over the next fifty years the scale was expanded to include observing sea and land conditions.

An **anemometer** is an instrument that measures wind speed. One common type consists of three or four cups that rotate in the wind. The speed at which they turn allows you to calculate wind speed. There are many other types including electronic digital anemometers, hot-wire anemometers, propeller anemometers, and laser anemometers.

Sailors and airplane pilots need to know the speed of the wind to successfully do their jobs. When might you want to know wind speed? How does wind speed affect running, riding your bike, or your tennis game? Who else needs to know wind speed?

Learn more:

- Do some research on the internet to learn about the history of the anemometer.
- The U.S. Department of Energy, Energy Efficiency and Renewable Energy Office provides state specific information about anemometer loan programs designed to help determine if a site has sufficient wind for a wind turbine.

http://www.windpoweringamerica.gov/anemometer_loans.asp





Measuring Wind Speed

QUESTIONS

- Observe the wind and use the Beaufort Scale (www.spc.noaa.gov/faq/tornado/beaufort.html) to estimate wind speed. How does this estimate compare with your protractor anemometer measurement?
- How could you improve the design of your protractor anemometer?
- What number pattern do you see in the conversion chart below? Describe it.
- Estimate the wind speed when the string angle is 85° .

CONVERSION CHART

STRING ANGLE	WIND SPEED (MPH)
90°	0
80°	8
70°	12
60°	15
50°	18
40°	21
30°	26
20°	33

- Surfers use information about wind speed and wind pressure. Learn more at: <http://exploratorium.edu/theworld/surfing/readit.html>

Instructions:

1. Attach a 12 – 15 inch thread or fishing line to the ping-pong ball, using tape or glue.
2. Tie the other end of the thread or fishing line through the center hole in the protractor.
3. Hold the protractor so the thread or fishing line crosses the 90° mark when there is no wind. Note: Be sure your body is not between the wind and your protractor.
4. When the wind blows the thread or fishing line, observe the angle where it hovers on the protractor. Note: You may want a partner to help you read this.
5. Use the chart to convert the angle measure to wind speed.
6. Compare your measurements to others in your group. If possible, compare your measurements to measurements from other wind speed instruments.

