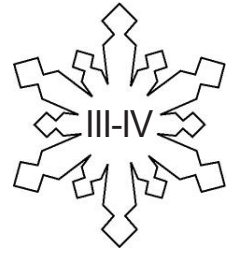


# Wind

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Levels



Grades 5-8

## Overview:

Wind speed helps scientists determine how fast clouds are moving and thus more accurately predict the weather. In this activity, students build an anemometer and measure wind speed.

## Objectives:

The student will build an anemometer and measure wind speed.

## 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.
- [6] SG2.1 The student demonstrates an understanding of the bases of the advancement of scientific knowledge by recognizing differences in results of repeated experiments.
- [8] SG2.1 The student demonstrates an understanding of the bases of the advancement of scientific knowledge by describing how repeating experiments improves the likelihood of accurate results.

## Whole Picture:

The term *wind* is used to describe the movement of air. Wind is the air reacting to differences in pressure, with air moving from higher pressure toward lower pressure. Wind can also be modified by mountains and can be turned by the spinning of the earth.

Wind direction and speed are monitored by meteorologists, pilots, sailors, scientists, architects and myriad others who need to know Earth's weather activity. From planning trips, to building sound structures to understanding what shapes Earth, wind speed and direction are integral.

An anemometer measures the force or speed of the wind. A common anemometer, such as the one constructed in this lesson, uses cups mounted on four horizontal arms at equal distance from each other on a vertical shaft. The air flow past the cups turns the cups in proportion to the speed of the wind.

Many anemometers convert the revolutions per minute into wind speed measured in several different ways:

**MPH (miles per hour)** – unit of speed measuring the number of miles covered in a period of one hour.

**Knots** – unit of speed measuring one nautical mile per hour.

**M/S (meters per second)** – unit of speed measuring the number of meters covered in one second.

**F/S (feet per second)** – unit of speed that tells the number of feet covered in one second.

**KM/H (kilometers per hour)** – unit of speed that tells the number of kilometers covered in one hour.

Information about wind speed, collected from anemometers world-wide, is used by weather forecasters, pilots, sailors, scientists and builders – to name a few.

A crane operator, for example, needs to know wind speed and direction when there are plans to operate a tall crane. A landfill must know the behavior of the wind in order to maintain odor control. The

speed at which the wind is moving the clouds is especially important in forecasting (predicting) the weather. A scientist may study the way in which wind causes erosion. From planning trips, to building sound structures to understanding what shapes Earth, wind speed and direction are integral

## Materials:

- Flexible straws (4 per student)
- Condiment cups (4 per student)
- Balsa wood or mat board, very thin, cut to 1-1/2" square (2 per student)
- Pencils with flat erasers (1 per student)
- Washers (1 per student)
- T-pins, large (1 per student)
- Sticker (1 per student)
- Stopwatch
- Computer with Internet access
- STUDENT INSTRUCTION SHEETS: "Build an Anemometer"
- STUDENT WORKSHEET: "Wind Speed"

## Activity Procedure:

1. Explain today students will build an anemometer, an instrument used to measure wind speed. Using the STUDENT INSTRUCTION SHEET: "Build an Anemometer" as a guide, lead students through the process of building anemometers.
2. Hand out the STUDENT WORKSHEET: "Wind Speed." As a class, look up the wind speed forecast at <http://climate.gi.alaska.edu/Wx/forecast.html>. Explain students will measure the wind themselves. Ask students to complete the Hypothesis section.
3. Take students outside. Ask them to use the anemometers to measure wind speed. Using the stopwatch to keep time, students should count how many times their anemometer spins in 20 seconds and record their measurements in the data section of their worksheets.
4. Bring students inside and instruct them to complete the remainder of their worksheets.
5. Discuss how this data could be used to predict weather.

## Answers:

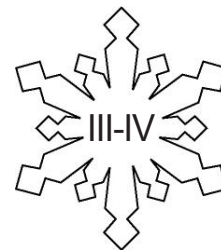
All answers will vary, except: Further Questions: 1. c) anemometer

Name: \_\_\_\_\_

# Build an Anemometer

## Student Instruction Sheet (page 1 of 2)

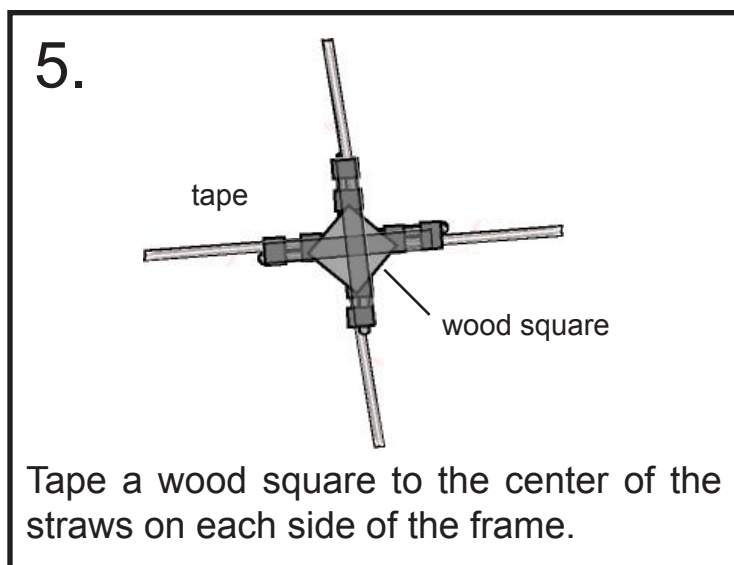
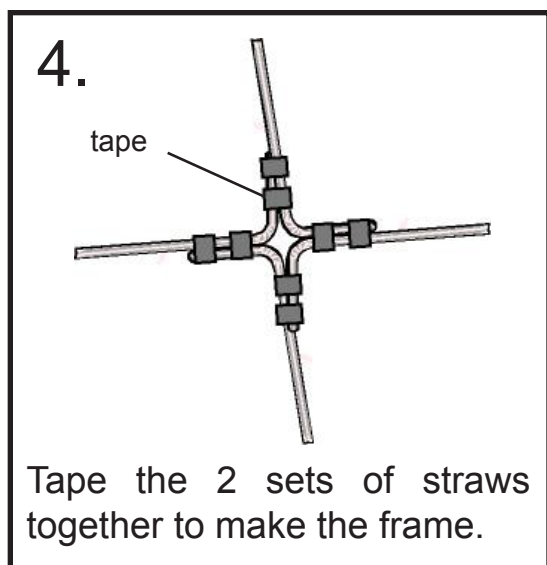
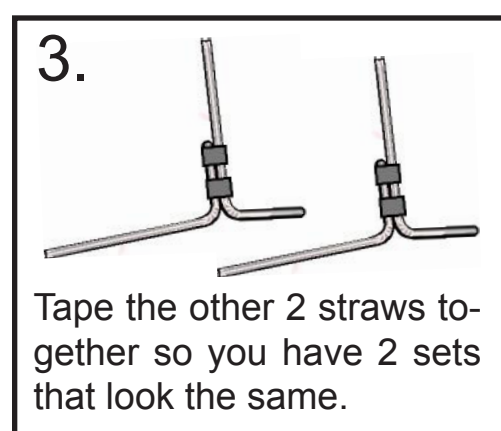
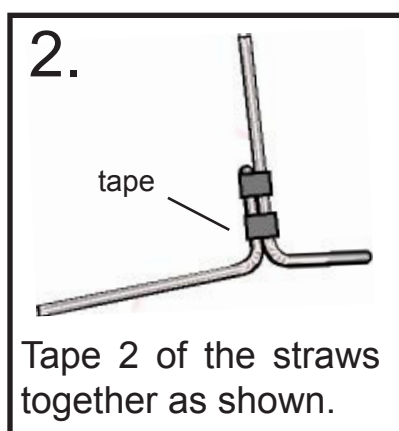
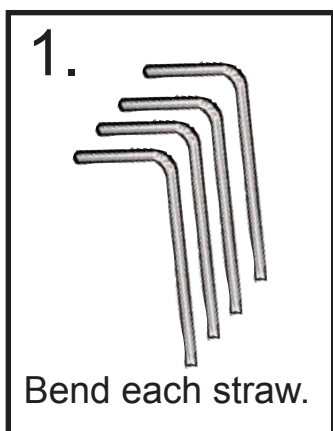
Levels



### Materials:

- 4 Flexible straws
- 4 Cups
- 2 Balsa wood squares
- 1 Pencil with a flat eraser
- 1 Washer
- 1 T-pin, large
- 1 Sticker
- Tape

### Directions:

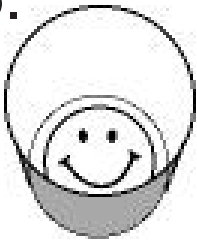


Name: \_\_\_\_\_

## Build an Anemometer

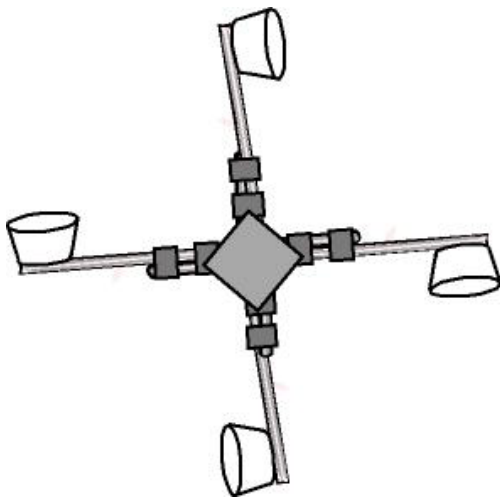
### Student Instruction Sheet (page 2 of 2)

6.



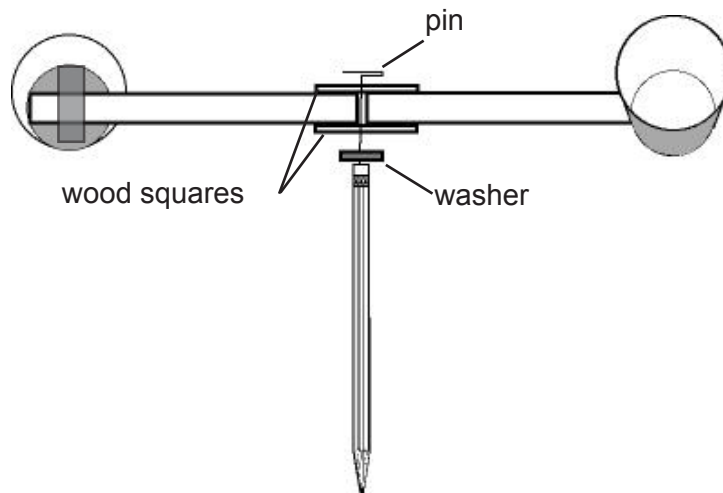
Put a sticker in the bottom of 1 cup.

7.



Attach 1 cup to the end of each straw. Make sure each cup is pointing the right direction!

8.



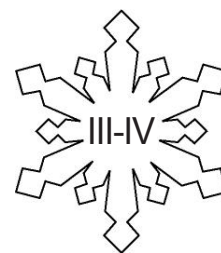
Poke the pin through the wood squares in the center of the frame. Put the end of the pin through the washer, then push the pin into the pencil eraser.

Name: \_\_\_\_\_

# Wind Speed

## Student Worksheet (page 1 of 2)

Levels



### Testable Question:

What is the wind speed today?

### Hypothesis:

The wind speed today is \_\_\_\_\_.

### Experiment:

#### *Materials:*

- Anemometer
- Stopwatch

#### *Procedure:*

1. Hold the anemometer so that the wind is blowing directly at it, causing it to spin around.
2. Work in teams. One student will serve as the timer, the other as the counter.
3. Counter: watch the cups, looking for the one with the sticker. When it rotates around to be visible, say "start."
4. Timer: when the counter says "start," start the stopwatch. Watch the stopwatch for 60 seconds. When it reaches 60 seconds, say "stop."
5. Counter: At start, begin counting the number of times the anemometer rotates, by counting the number of times the sticker appears. After the timer says "stop," record the number of rotations in the Data section.
6. Switch positions and repeat.
7. Repeat steps 3 through 6 three times.

### Data:

1. The National Weather Service daily wind speed forecast is \_\_\_\_\_ mph.
2. In the chart below, record the number of times the anemometer rotated in the 60-second period.

Test	Number of Rotations
1	
2	
3	

Name: \_\_\_\_\_

# Wind Speed

## Student Worksheet (page 2 of 2)

### Analysis of Data:

3. Take an average of the three measurements.

$$\left( \frac{\quad}{\text{test \#1}} + \frac{\quad}{\text{test \#2}} + \frac{\quad}{\text{test \#3}} \right) \div 3 = \quad \text{rotations per minute}$$

### Conclusion:

1. The wind speed today is \_\_\_\_\_.
2. Was your hypothesis proved or disproved? \_\_\_\_\_

### Further Questions:

1. Scientists use a(n) \_\_\_\_\_ to measure wind speed.
  - a. rain gauge
  - b. barometer
  - c. anemometer
2. Was the National Weather Service wind speed forecast the same or different than your measurement?  
\_\_\_\_\_

3. Why might the National Weather Service measurement be different?

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