

Name \_\_\_\_\_

Date \_\_\_\_\_

## Homemade Weather Instruments

**Objective:**

Many of the weather instruments that are used to record weather observations can be recreated (in simplified versions) using materials commonly found at home. The objective of this lab is to build a simple anemometer and barometer to record weather observations.

**Estimated Completion Time:** 60 minutes

### Part I. Building a Barometer

**Materials:**

- Small coffee can or empty food can
- Plastic wrap
- Scissors
- Tape
- Drinking straw
- Index Card or sturdy piece of paper
- Rubber band

1. Using the plastic wrap, cover the top of the can and secure it using the rubber band. The plastic wrap should form an airtight seal over the can.
2. Place the straw horizontally on the top of the can. Make sure it is centered width-wise (looking down, the straw should split the top of the can into two half circles). Tape the straw in place.
3. Tape the index card to the can behind the straw (you may need to trim the straw for this).
4. Record the location of the straw on the index card with a pencil.
5. Continue recording the location of the straw as often as you want. Does the location of the straw change? For a particular straw reading, you can look up the current pressure at a nearby station on CRONOS and make note of it on your card.

You've now built your very own barometer!

### Questions and Discussion

1. Record a few observations, do you see any changes in the location of the straw?
2. Describe how your homemade barometer works.
3. If the straw moves up on the card, what kind of pressure would you expect? Why?
4. Recall the ECONet tour you went on at the beginning of this internship. Do you think your homemade barometer is more or less accurate than the one on the tower? What are some advantages the *automated* barometer on the tower has over your homemade barometer?

## Part II. Building an Anemometer

### Materials:

- Scissors
- 5 cups (such as dixie or solo cups), one should be of a different color.
- Pen
- 2 strips of stiff cardboard
- Ruler
- Stapler
- Push pin
- Pencil with an eraser on the end
- Watch with a second hand or a timer.
- Small fan (optional).
- Calculator

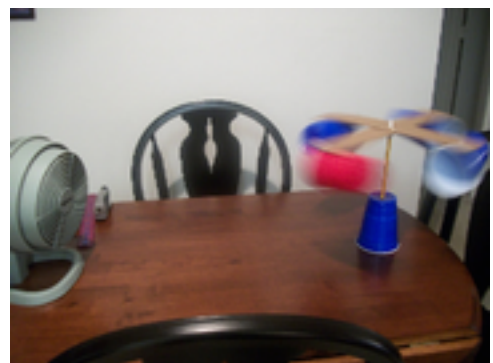


### Steps:

1. Cross the cardboard strips so they make a plus sign and staple them together.
2. Using the ruler and pencil, find the center of the two pieces of cardboard by drawing lines down the center of each piece and finding where they intersect.
3. Staple 4 of the cups, including the cup with the different color, to the ends of each cardboard piece. Make sure all the cups are facing the same direction relative to the cardboard pieces.
4. Push the pushpin through the center of the cardboard pieces. Take the pencil and push the eraser onto the pin sticking out of the cardboard pieces.
5. Using the scissors, poke a small hole in the center of the bottom of the remaining cup. Insert the pencil into this cup.



6. If you have a small fan available, set it up several feet away from the anemometer and turn it on to a low speed. Using the stopwatch, count the number of rotations in 15 seconds and multiply this number by 4 to get the number of rotations per minute. If you do not have a fan, take the anemometer outside to a bench or table and repeat the exercise.



### Questions and Discussion

1. Record a few observations at various wind speeds or locations. Does the anemometer reflect the wind speeds you expected? If you took your anemometer outside, what differences did you observe in the rotations per minute at the various locations? What might have caused these differences?

2. What is the actual wind speed measured by your anemometer? To determine this, you will need to find the circumference of the circle made by the two cardboard pieces and multiply this number by the recorded rpm (rotations per minute).

Example:

rpm: 20

Length of cardboard piece: 20 inches (this is the diameter of the circle)

$\pi$ : 3.14159

Circumference =  $\pi$  \* diameter

=  $\pi$  \* 20in

= 62.83 in

Speed = circumference \* rpm

= 62.83in \* 20

= 1256.6 in/minute

= 0.0198 miles/minute (divide by 63360 = 5280\*12)

= 1.19 miles/hour (multiply by 60)

## STUDENT WORKSHEET

*(continue work for question 2)*

3. The speeds you calculated in question 2 are likely slightly different than the actual wind speeds. What are some possible reasons? How do your results compare to your fellow interns?