ACTIVITY 4: BUILD AN ANEMOMETER

The purpose of this activity is for students to build a working anemometer* and use it to measure the speed of the wind (either naturally-occurring wind outdoors or wind produced indoors using a fan).

The type of anemometer students will be making in this activity is a version of the hemispherical "cup" anemometer that was invented in 1846 by John Thomas Romney Robinson. You will want to show **a photo of a traditional cup anemometer like this**.

Materials Needed:

- stopwatch or timer measured in seconds
- plastic straws
- masking or gift-wrapping tape
- flat thumb tacks or T-pins
- pencils
- small paper cups (2oz or 3oz)
- scissors
- a box fan

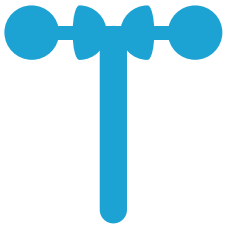
First, inform students that they will be working with a partner to build a cup anemometer to measure wind speed. Show students a photo of a cup anemometer.

Then, provide students the supplies they'll need to build their anemometers. They do not all have to be built to look exactly alike.

Next, give students time to plan out how they are going to build** their anemometers using the given materials. Encourage them to make a sketch of their design before they begin building their anemometers.

**Build an anemometer of your own to work through the steps before doing this activity.*

***If students are struggling to see how the materials would combine to make an anemometer, ask them to draw a cup anemometer like they one that was shown to them and list out which materials could correspond to each part of the device.*



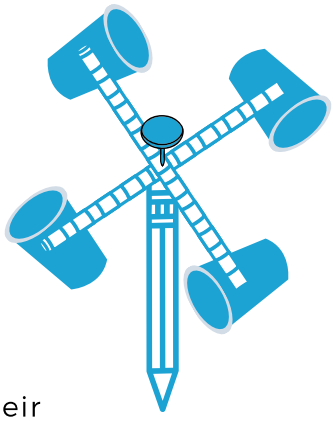


Image Credit: Gary Abud, Jr.

Last, after groups have completed building their anemometers, allow them time to test their designs and make improvements (and, if needed, retest and further make adjustments to the design.) Once anemometers are completed and working, it's time to use them to measure wind speed! That will require a bit of calibration first, though. Here's how:

1. Measure the diameter of their anemometer from the outside edge of one cup all the way across to the outside edge of the opposing cup.
2. Use the diameter to calculate the circumference of the anemometer according to the formula $C = \pi d$. This will give you the distance a cup travels around the anemometer once.
3. Now use a fan to get the anemometer spinning at a steady rate.
4. Have students watch their spinning anemometer (maybe even marking one of the cups with a colored marker so it is easier to follow while spinning.)
5. Start the timer and measure the time it takes for the anemometer to spin around ten full times.
6. Divide the time for ten spins by ten to get the time for one spin.
7. Knowing the distance for one spin divided by the time to complete one spin will give you the speed.

The anemometer can now be used in the same way to measure various wind speeds. The units students used to measure distance and time can be converted to determine wind speed in miles per hour.