DIY Weather Station Part 3- The Anemometer:

Few natural forces shape Nantucket as much as wind does. Look around- especially at our trees. Along the perimeter of the island, trees grow crooked, stunted and gnarly. They survive where few others can- in the salt spray zone. Waves crashing on the beaches produce a fine mist which is carried by the wind. This salt spray kills many plants, but not our hardy species such as Atlantic cedar. Not only do they handle the salt spray, they withstand frequent storms, growing crooked from the wind.

Much like rain gauges and thermometers, anemometers have been around for a long, long time. The word anemometer comes from the Greek root *anemos*, meaning wind. The instructions detailed here show you how to measure the wind gusting through your backyard using simple household items. Building this anemometer will show you whether the wind is blowing, and there is an extra step for those math whizzes out there who want to know *how fast* the wind is blowing!

Materials:

- Three ping pong balls- And a spare in case you break one!
- Sharpie or masking tape to mark one of your ping pong ball "wind scoops" for determining number of rotations
- Paper cup for anemometer's structure
- Modeling clay to secure straw and base
- Three bamboo kabob skewers
- Straw or plastic tube that skewer can rotate in
- Cardboard base to mount your anemometer. This base should be wide enough to place stones, etc. for weight so the wind doesn't tip your anemometer over
- Ruler

- Scissors or utility knife (adult supervision required)

Instructions:

1. Cut out a cardboard base, large enough to weigh down your instrument and keep it stable. The typical paper cup does well with a 6''x6'' base.
2. Cut the straw down so that it is slightly taller than the paper cup.
3. Poke a hole in the bottom of the paper cup, large enough so the straw will fit snugly.
4. Using modeling clay, mount the paper cup to the carboard base with bottom up.
5. Insert straw into the cup until it reaches carboard base. Secure straw in place with modeling clay. Make sure it's as vertical and straight as possible!
6. Poke holes in top and bottom of one ping pong ball and put one bamboo skewer through it- this skewer will be the axis on which your anemometer rotates.
7. Poke four holes in ping pong ball for the other two bamboo skewers to be mounted. These skewers should form a horizontal "x" which will support your anemometer's wind scoops.
8. Carefully cut your other two ping pong balls in half. Once cut in half, poke holes on opposite sides and mount them on the horizontal skewers. If you plan to calculate wind speed, be sure to mark one of the scoops with a marker or piece of tape. This will make it easier to count anemometer rotations.
9. Set up your anemometer where there's a good breeze and have some fun!

What to look for:

As wind speed increases, your anemometer will spin faster and faster. Wind follows daily patterns- Notice that wind speed is often highest in the afternoon on Nantucket. Have you ever noticed that there are more calm, windless mornings than calm afternoons? Why do you think this is? There are other patterns the wind follows that you can discover with your DIY anemometer, and if you're really interested there are professionally built, extremely accurate versions available in many stores and online. These units are often affordable and easy to set up, making them a great option for a beginner meteorologist!

Math extension: How fast is the wind blowing?

You will need these equations:

Wind Speed = Circumference x rotations per hour

Circumference = $2\pi r$

r = radius

Essentially, to determine wind speed we need to figure out how far the half ping pong ball "scoop" has travelled and how long it took to travel that distance. Begin by finding the radius, which is the distance from the center of the anemometer to the outer edge of the wind scoop. Once you've found the radius, plug it into the second equation to find the circumference of your anemometer. Once you've found circumference, plug that into the first equation to find the wind speed. While your homemade anemometer won't be as accurate as a professionally built one, you'd be surprised how close you can get!

DIY anemometer materials:

Completed anemometer: