Build an Anemometer

Suggested Grades: 3–8

Activity Overview

Weather, including wind, is a very important thing to consider when flying an airplane. In this activity, you will build an anemometer, which is an instrument used to measure wind speed. Note: For this activity, you will be inserting a pin through the straws and into an eraser. You may need to ask an adult to help you with this.

Time: 30 minutes

Materials:

- Four small paper cups
- Two straws (nonflexible)
- Tape
- Stapler
- One long pin such as a sewing pin, t-pin or other pin long enough to go through the straws and firmly into the pencil eraser
- One pencil with eraser
- One marker

STEPS

1. Make a cross with two plastic drinking straws. Tape them together so that the cross has four legs of equal length. See *Figure 1*.

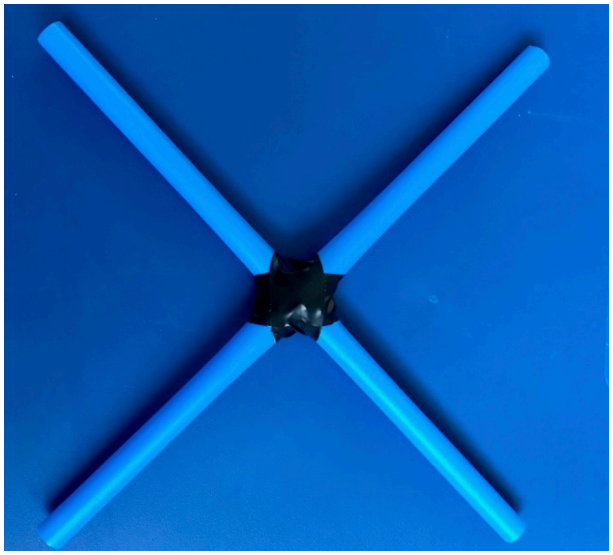

Figure 1: Use tape to hold the straws together.

2. Push the pin through the center of the cross and into the eraser of the pencil. This will create the axle and provide something to help keep the anemometer attached to the base. See *Figure 2*. **Hint:** Spin the straws several times, both clockwise and counterclockwise, to slightly widen the hole that the pin made in the straws. This will allow the anemometer to spin more freely in the wind. You can also make the hole larger by moving the pin in and out several times.

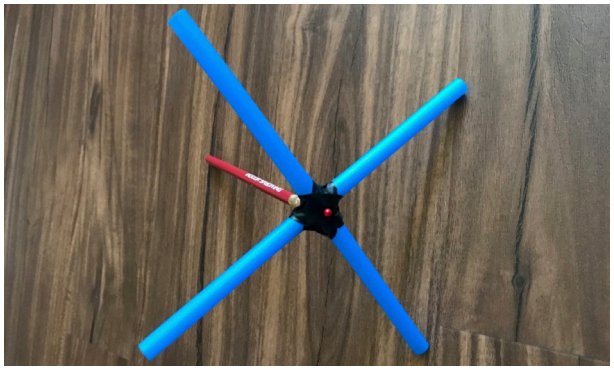

Figure 2: Attach the straws to the pencil with a pin.

FLIGHT LOG ENDORSEMENT CODE: BLDANEM

3. Staple a paper cup to each leg, ensuring they all point in the same direction. See *Figure 3*. Also, it is a good idea to add tape to help keep the cups attached and pointing in the correct direction.

4. Using the marker, clearly mark one of the cups so it is differentiated from the others while spinning. See *Figure 3*.

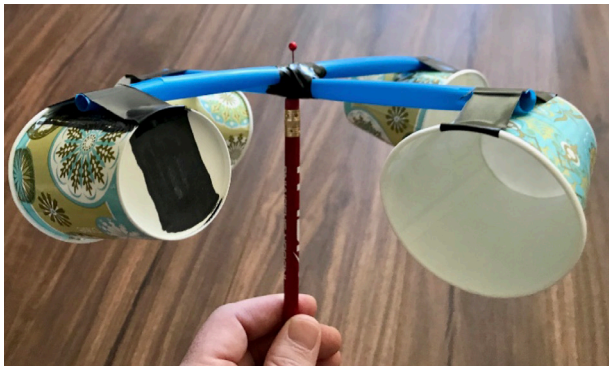

Figure 3: Attach the cups to the straws using a stapler.

5. Place your anemometer into a steady source of wind, such as a fan, an air vent or the wind outside. Count the number of revolutions the anemometer makes in one minute by counting how many times the marked cup passes. See *Figure 4*.

Figure 4: Figure 4: Place the anemometer in a stream of air to see it rotate.

6. If possible, try placing your anemometer into streams of air that move at different speeds. Did it rotate faster or slower with different winds speeds?

You Might Want to Try:

- On a windy day, take the anemometer outside and count how many revolutions it makes in one minute. If you can find the actual wind speed, you can figure out how many revolutions each mile per hour of wind is.

- If you can find different sized paper cups, try making an anemometer with them, and see how the revolutions change in the same stream of air with different sized cups.

Background Information

Weather is the state of the atmosphere with respect to wind speed and direction, temperature, moisture and pressure. A pilot needs to consider all of these things while flying since each has a significant impact on the ability of both the airplane and the pilot to perform properly.

Weather also impacts rocket launches since the rocket needs to pass through Earth's atmosphere on its way to space. Weather is primarily driven by temperature and moisture differences between two places. The different temperatures affect the pressure of the air, which causes the warm air from the high pressure areas to move to areas of low pressure. This movement of the air is what we refer to as wind.

Wind direction and speed play important roles for an aircraft in flight as well as and during takeoff and landing. Aviation weather reports include information for both surface winds and winds aloft, or the winds at altitude. When taking off or landing, a pilot ideally wants what is known as a headwind, where the air flows opposite to the direction of travel. This enables the aircraft to use less runway, or to carry more weight into the air. Having a headwind while in flight, though, will make the plane slower and burn more fuel; therefore, during flight a tailwind is preferred. The opposite of a headwind, a tailwind is when air flows with the direction of travel.

One final term that pilots refer to is a crosswind. While having little effect on a flight while cruising, a strong crosswind, or wind blowing from the side of the aircraft, makes landing more difficult as it is harder to keep the aircraft aligned with the runway.

National Aeronautics and Space Administration

NASA Headquarters
300 E. Street, SW
Washington, DC 20546

www.nasa.gov

EP-2024-11-631-HQ