# MONDAY MORNING SCIENCE BLAST

*BLOWING IN THE WIND*

The word tornado comes from the Spanish word "tronada" which means a thunderstorm. A tornado, also known as a twister, is a violent spiral-shaped storm with a rapidly rotating column of air rising upward forming a vortex. The vortex has relatively low pressure at the center and is shaped like a funnel. Tornadoes that occur over oceans are called waterspouts; they are usually weaker than tornadoes.

The conditions that create severe thunderstorms and tornados are basically the same. Most violent tornadoes are formed from powerful thunderstorms known as supercells. Some signs of a coming tornado are a light rain, then, heavier rain and rain mixed with hail. Tornadoes usually occur during the spring and early summer.

Tornadoes usually last only a few minutes, but they are very intense. Their wind speeds range from 50 mph to over 300 mph. The damage path of a tornado is usually less than 1,700 feet wide, and they travel at less than 40 mph. Each year, the United States ranks number one in tornado incidence, with Australia coming in second. Very often, the most devastating ones occur in Bangladesh.

The damage from a tornado is determined by the speed of its winds. Tetsuya Theodore Fujita, a weather scientist, developed a scale known as the Fujita Tornado Intensity Scale to determine the damage based on wind speed. According to this scale, tornados are ranked from the F-0 (the lightest tornado) to the devastating F-5 tornado that lifts houses off foundations and can throw cars hundreds of feet.

In this lab, students construct a simple anemometer to measure wind speed. To do the lab, each team will need a length of kite string, some packaging tape, a ping pong ball, a protractor, and access to a variable speed fan. Begin the lab by having the students construct the anemometer. Instruct them to cut a one-foot length of string and to tape one end of the string to a ping-pong ball. Tie or tape the other end to the small hole at the center of the protractor's flat edge as shown in the figure on the student page. Next have the students label the protractor as directed on the student page.

Once the anemometer is made, instruct the students to hold it with the flat base at the top, so it's level. The ping-pong ball should hang straight down. Have them turn the fan on low. Direct them to keep the protractor about 50 cm from the fan and as far from their body as they can, so they are not blocking any of the wind. Aim the protractor so the ping-pong ball is blown along the side of the protractor, not into or away from it. Measure the wind's speed by seeing which degree mark the string is pointing at. Record the wind speed in the data table. Have the students repeat this step two more times recording the wind speed each time. Now have them test the wind speed generated by the fan at each of the settings, following the same procedure as above.

The real fun begins when students have the opportunity to measure the actual wind speed on a windy or stormy day.  The more blustery, the better!

# Blowing in the Wind

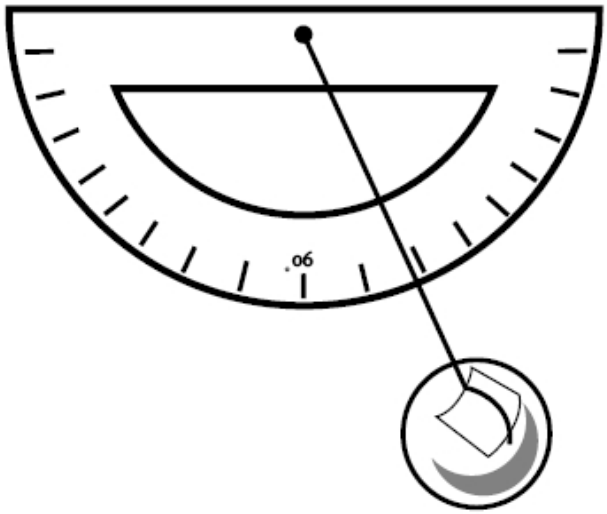
**QUESTION:** How can wind speed be measured?

**MATERIALS:**

| | |
|---|---|
| Kite string | Ping pong ball |
| Packaging tape | Protractor |
| Pens | Variable speed fan |

**PROCEDURE:**

1. Cut a one-foot length of string.
2. Tape one end of the string to a ping-pong ball, and tie or tape the other to the small hole at the center of the protractor's flat edge (see figure below).
3. Label the protractor as follows:
   - mark the 90° mark of the protractor "0 mph"
   - mark the 80° mark of the protractor "8 mph"
   - mark the 70° mark of the protractor "12 mph"
   - mark the 60° mark of the protractor "15 mph"
   - mark the 50° mark of the protractor "18 mph"
   - mark the 40° mark of the protractor "21 mph"
   - mark the 30° mark of the protractor "26 mph"
   - mark the 20° mark of the protractor "33 mph"
4. To use this anemometer, hold it with the flat base at the top, so it's level. The ping-pong ball should hang straight down.
5. Turn the fan on low. Keep the protractor about 50 cm from the fan and as far from your body as you can, so you're not blocking any of the wind. Aim the protractor so the ping-pong ball is blown along the side of the protractor, not into or away from it. Measure the wind's speed by seeing which degree mark the string is pointing at. Record the wind speed in the data table.
6. Repeat step 5 two more times.
7. Repeat steps 5 and 6 with each of the settings on the fan.
8. When you have a windy day, use your anemometer to measure the real wind, and record the wind speed in the data section.



**DATA:**

| FAN SETTING | TRIAL | WIND SPEED |
|---|---|---|
| **Low** | 1 | |
| **Low** | 2 | |
| **Low** | 3 | |
| **Medium** | 1 | |
| **Medium** | 2 | |
| **Medium** | 3 | |
| **High** | 1 | |
| **High** | 2 | |
| **High** | 3 | |

**QUESTIONS:**

1. What does an anemometer do?

2. How is the wind produced from a fan different from the natural wind?

3. What scale do scientists use to measure the wind?

4. Scientists classify tornados as class F1 - F5. They classify hurricanes as Category 1 - Category 5. How does an F1 tornado compare to a Category 1 hurricane? How does an F5 tornado compare to a Category 5 hurricane?

5. Which cause more damage, tornados or hurricanes? Why?