ANEMOMETER #1000

HOW TO USE THE ANEMOMETER

The anemometer is a simple device used to determine wind speed. It is simple enough for elementary children to understand and use while accurate enough to be used by professional meteorologists in weather forecasting.

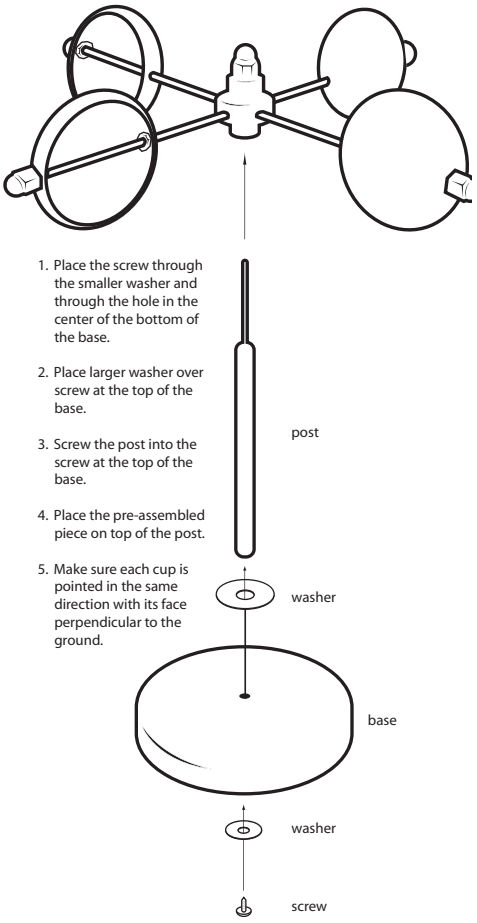
The unit consists of a post with revolving wind cups. These cups are each mounted on horizontal arms which extend from the axis of rotation. Make sure that each cup is pointed in the same direction with it's face perpendicular to the ground.

One cup will be of contrasting color, usually red, with the remaining cups colored black.

Set this unit outside on a table away from buildings and other obstacles. It is best to place the unit at least four feet off the ground. Start your stopwatch and count the revolutions of the cups. Use the contrasting cup (red) as your indicator. It will be easier to watch this one cup and count the number of times it reaches your position. Continue counting the revolutions for one minute. Write this number down and repeat the procedure. Do this two more times.

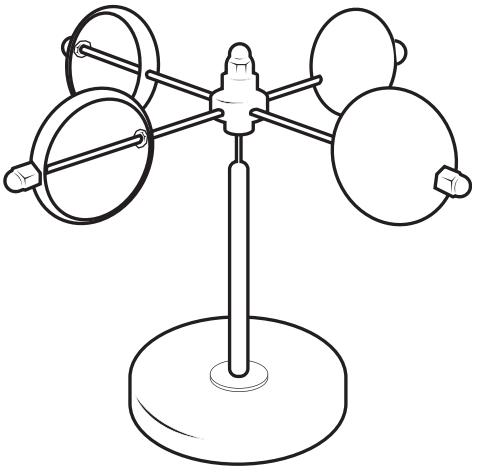
Now find the average by adding the three readings and then dividing your total by three. This will give you the average revolutions per minute.

Take readings like this for several days and record your results. Each day make note of the changes in the speed of the anemometer and the weather conditions. It would also help to take note of the daily local weather forecast, specifically the wind conditions, and then compare the numbers between your findings and the local weather man. This will help you to roughly calibrate your anemometer and will help you to accurately announce the prevailing wind speeds before everyone hears the evening news.



WHAT IS WIND?

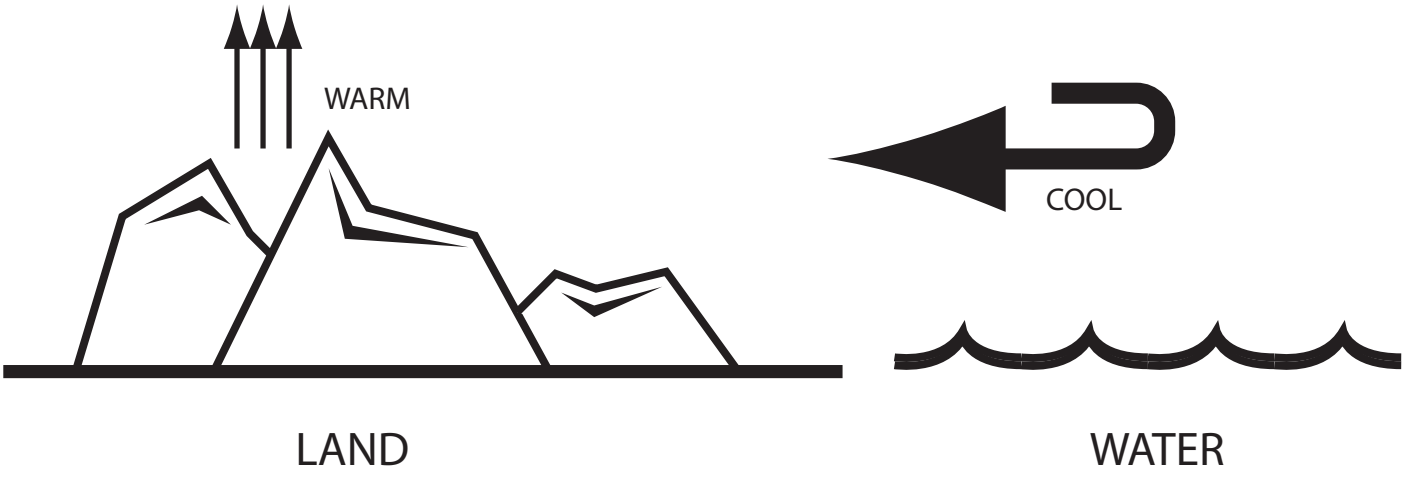
Simply put, wind is air that moves in currents from one place to another. The wind's direction is defined by the direction from which it comes, not by the direction it is going. In other words, a northwest wind at twenty-five miles per hour is coming from the northwest and is heading southeast. There are several different factors that influence how and why the air moves. Three of the most basic factors are convection, the Coriolis force, and friction.



CONVECTION

Convection is the main contributor to the development of wind. When warm air rises due to the heat from the sun or other geographic phenomena, it leaves a vacuum in its place. Cooler air then rushes in to fill this void, creating wind. Take, for example, a coastal town on a sunny day. Both the ground and the asphalt absorb energy from the sun, heating the surrounding air. The air is also heated by the energy generated by automobiles, industrial plants, and homes. Because this warm air is less dense than the cooler air above it, it rises. Meanwhile, the air over the ocean is being cooled by the

water and the slapping waves. This cool moist air is heavier than the warmer air above it, so it hangs close to the surface of the water and the coast. As the warm air in town rises, the cooler air from the ocean rushes in to take its place, creating an air current, or wind. Then the process starts all over again as the cool air from the ocean is warmed by the town. These are called convection currents.



THE CORIOLIS FORCE

Our second factor, The Coriolis Force, affects the direction of the air currents more than the generation of wind. The Coriolis force is caused by the rotation of the earth. Everyone knows that the earth is spinning, but many people don't realize that we are traveling at different speeds depending on our position. Near the equator, the earth's velocity is close to one thousand miles per hour, while the Polar Regions are traveling at a much slower speed. This difference in velocity causes air currents (and everything else that moves) to shift direction as they flow – in the northern hemisphere, motion will be deflected to the right, while in the southern hemisphere motion will be deflected to the left. The Coriolis force will not have a strong effect on slow moving air currents, but it will cause higher speed air currents to rotate, generating tropical storms and hurricanes.

FRICTION

A third factor that can influence air currents is friction. Friction does not generate wind or affect its direction, but it does create frictional deceleration, which affects the wind speed. Friction can only exert an influence on wind after the air is in motion, and its effects are limited to the lower one kilometer above the Earth's surface (where the density of the air molecules is highest). Friction is created as air molecules within a current knock into each other, or as molecules drag across each other in streams, causing wind currents to slow.

As a reference to wind speed you might try thinking in the following terms:

Smoke rises without drift	winds 0 mph
Leaves rustle	winds 4 to 7
Tree limbs sway	winds 19 to 24 mph
Makes walking difficult	winds 39 to 46 mph
Trees Uprooted	winds 55 to 63 mph
Hurricanes, Tropical Storms and Blizzards	winds above 75 mph