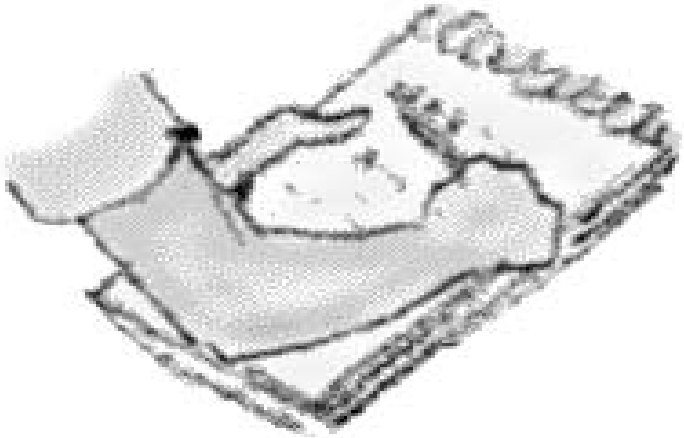
Using Weather Instruments

Keep Your Own Weather Journal

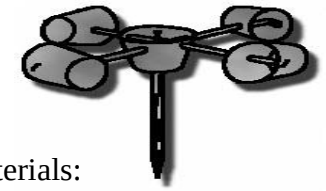


At least once each day, you should record the measurements from each of your weather instruments in your weather station. Keep an orderly chart, like the one pictured, so that you'll be able to notice patterns in your weather data.

Data Observations

Date	12/20	12/21
Time	11:16	1:04
Temperature	44	46
Barometric Pressure	30.26	30.32
Humidity	High	High
Precipitation Type	None	Rain
Precipitation Amount	Ø	1/4 in.
Wind Direction	W	NW

Make Your Own Anemometer

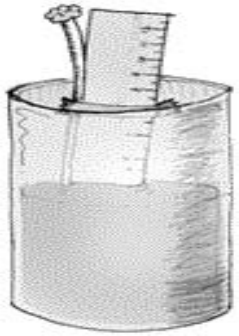


You'll need these materials:

five 3 ounces paper Dixie cups
two straight plastic soda straws
a pin, scissors, paper punch, small stapler, and sharp pencil with an eraser

Take four of the Dixie cups. Using the paper punch, punch one hole in each, about a half inch below the rim. Take the fifth cup. Punch four equally spaced holes about a quarter inch below the rim. Then punch a hole in the center of the bottom of the cup. Take one of the four cups and push a soda straw through the hole. Fold the end of the straw, and staple it to the side of the cup across from the hole. Repeat this procedure for another one-hole cup and the second straw. Now slide one cup and straw assembly through two opposite holes in the cup with four holes. Push another one-hole cup onto the end of the straw just pushed through the four-hole cup. Bend the straw and staple it to the one-hole cup, making certain that the cup faces in the opposite direction from the first cup. Repeat this procedure using the other cup and straw assembly and the remaining one-hole cup. Align the four cups so that their open ends face in the same direction (clockwise or counterclockwise) around the center cup. Push the straight pin through the two straws where they intersect. Push the eraser end of the pencil through the bottom hole in the center cup. Push the pin into the end of the pencil eraser as far as it will go. Your anemometer is ready to use. Your anemometer is useful because it rotates with the wind. To calculate the velocity at which your anemometer spins, determine the number of revolutions per minute (RPM). Next calculate the circumference (in feet) of the circle made by the rotating paper cups. Multiply your RPM value by the circumference of the circle, and you will have an approximation of the velocity of at which your anemometer spins (in feet per minute). (Note: Other forces, including drag and friction, influence the calculation but are being ignored for this elementary illustration. The velocity at which your anemometer spins is not the same as wind speed.) The anemometer is an example of a vertical-axis wind collector. It need not be pointed into wind to spin. (Note: This paper cup anemometer will produce a reasonable approximation of circumferential velocity, but should not be used for any purpose other than elementary illustration.)

Make Your Own Barometer

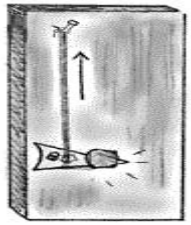


You'll need these materials:

- a glass or beaker with straight sides
- a ruler (12 inch)
- tape
- one foot of clear plastic tubing
- a stick of chewing gum
- water

Begin by standing the ruler in the glass and holding it against the side. Tape the ruler to the glass. Make sure that the numbers on the ruler are visible. Stand the plastic tube against the ruler in the glass. Make sure that the tube is not touching the bottom of the glass by positioning the tube up a half inch on the ruler. Secure the tube by taping it to the ruler. Chew the stick of gum so that it is soft. While you're chewing, fill the glass about half way with water. Use the plastic tube like a straw and draw some water half way up the tube. Use your tongue to trap the water in the tube. Quickly move the gum onto the top of the tube to seal it. Make a mark on the ruler to record where the water level is in the tube. Each time you notice a change in the water level, make another mark. You'll notice, over time, that the water level rises and falls. Pay attention to the change in weather as the water level changes. The water in the tube rises and falls because of air pressure exerted on the water in the glass. As the air presses down (increased atmospheric pressure) on the water in the glass, more water is pushed into the tube, causing the water level to rise. When the air pressure decreases on the water in the glass, some of the water will move down out of the tube, causing the water level to fall. The change in barometric pressure will help you to forecast the weather. Decreasing air pressure often indicates the approach of a low pressure area, which often brings clouds and precipitation. Increasing air pressure often means that a high pressure area is approaching, bringing with it clearing or fair weather.

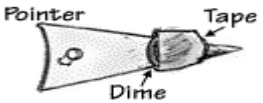
Make Your Own Hygrometer



You'll need these materials:

- a scrap piece of wood or flat Styrofoam (about 9 inches long and 4 inches wide)
- a flat piece of plastic (about 3 inches long and 3 inches wide) thin enough that you can cut
- 2 small nails
- 3 long strands of human hair (about 8 inches long)
- a dime, glue, tape, hammer, and scissors (strong enough to cut plastic)

First, cut the piece of plastic into a triangular shape (refer to pictures). Then, tape the dime onto the plastic, near the point. Poke one of the nails through the plastic pointer, near the base of the triangle. Wiggle the nail until the pointer moves freely and loosely around the nail. On the plastic pointer, between the dime and the nail hole, glue the hair strands to the plastic.



Position the pointer on the wood or Styrofoam base about three quarters of the way down the side. (Refer to picture.) Attach the nail to the base. The pointer must be able to turn easily around the nail. Attach the other nail to the base about one inch from the top of the base, in line with the pointer. Pull the hair strands straight and tight so that the pointer points parallel to the ground. That is, make sure the point of the pointer is perpendicular to the hair. The hair should hang perfectly vertical and the pointer should point perfectly horizontal. Glue the ends of the hair to the nail. If the hair is too long, trim the ends. The human hair cells will indicate the level of moisture in the air by expanding and contracting. When their air is moist, the hair will expand and lengthen, making the pointer point down. When the air is dry, the hair will contract and shorten, making the pointer point up. When you make your hygrometer observations each day, you should make a mark to indicate where the pointer points. Over time, you'll be able to see the humidity patterns that will help you forecast the weather.

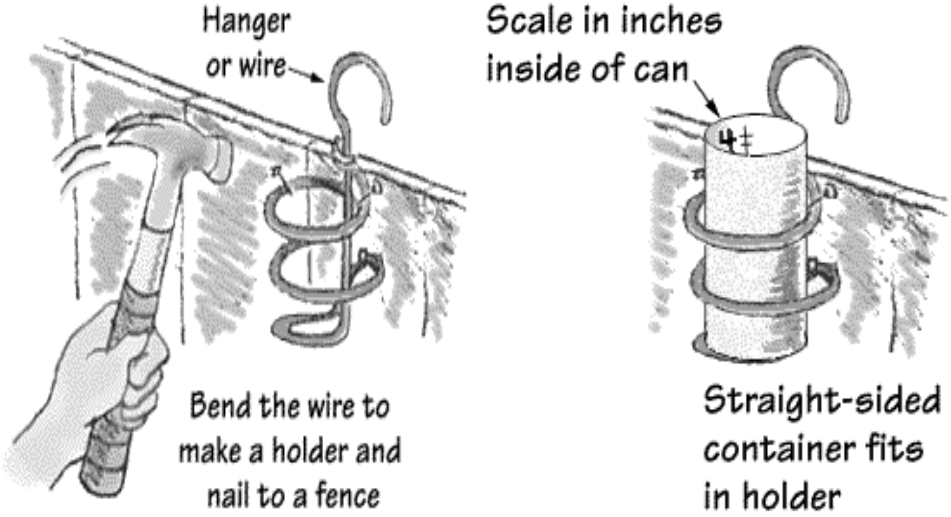
Make Your Own Thermometer Screen

You'll need these materials:

- a plastic box
- scissors
- white paint
- a broom handle
- a thermometer
- a piece of thin cloth
- a small container of water

Take the plastic box and cut a number of slits into one side. Paint the outside of the box white. Attach the box to the broom handle. Site your thermometer screen over a grass surface, with the base of the box 1.25 metres above the ground. Place the thermometer inside the box, ensuring that the bulb is not resting on the base of the box. You could also measure the wet-bulb temperature. Wrap a piece of thin cloth around the bulb of a thermometer, and place the thermometer in a small container of water. This thermometer can also be kept in your screen. By reading the wet– and dry-bulb temperatures, you can calculate the humidity using tables available from the Met Office. The Thermometers can be read at the same time as you measure the rainfall. Alternatively, you can read them at regular intervals, e.g. one, two or three hours.

Make Your Own Rain Gauge

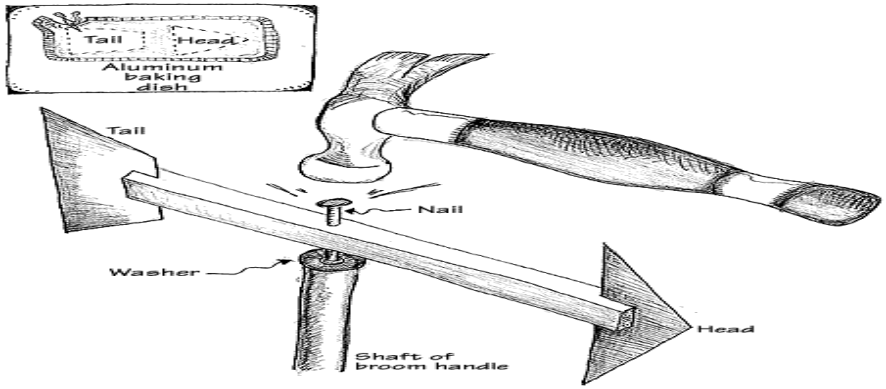


You'll need these materials:

- a glass beaker (or any straight-sided glass that can be marked with a measuring scale)
- a coat hanger or wire (bent to make a holding rack– see picture)
- hammer and nails (to secure the rack)

Basically, any measuring glass left outside can serve as a rain gauge. However, since most rain showers are usually quite windy, you'll want to fasten your rain gauge somewhere so that it doesn't blow over. Locate a good place for your gauge. There should be nothing overhead, like trees, electric wires, or the edge of a roof. These obstructions can direct rainwater into or away from your gauge, creating a false reading. The edge of a fence, away from the building, is often a good place for your gauge. Once you have found the spot, attach the holding rack (refer to picture). Then, slip your measuring glass into position. Wait for rain, then record your measurement, and empty the glass.

Make Your Own Weather Vane



You'll need these materials:

a long wooden dowel (about the size of a broom stick)
an aluminum pie plate
a 12 inch long piece of wood (A sturdy ruler would work)
nails, a metal washer, hammer, glue, small saw (or serrated knife), wire (for mounting), and scissors (strong enough to cut aluminum)

Begin with the 12 inch piece of wood. Use the small saw (or serrated knife) to cut a vertical slit at each end of the stick. The slit should be about one half inch deep. At the midpoint (exactly halfway) of the top of the stick, hammer one nail all the way through the stick. Then turn the wood around the nail several times until the stick turns easily around the nail. Refer to the pattern picture and cut the head and tail from the aluminum plate. Glue the head into the slot at one end of the wooden stick. Glue the tail into the other end. Allow time for the glue to dry before you take the vane outside. Attach the weather vane to the long wooden dowel by placing the metal washer on the end of the dowel and then hammering the nail through the wooden stick and into the wooden dowel. (Refer to the picture.) Make sure that the vane moves freely and easily around the nail. Now you are ready to mount your weather vane outside. If you mounted your rain gauge on a fence, you may want to mount your weather vane near it. Position the wooden dowel beside the fence and secure it with wire. Try to get the vane as high above the fence as you can while still keeping the dowel steady and secure. The head of the pointer will always point to the direction from which the wind is blowing. For example, if the head points to the Northeast, then the wind is blowing from the Northeast. It's as simple as that. (A common mistake is to think that the wind is blowing toward the Northeast.) Record your wind direction readings in your weather journal.

Comparing Daily Observations

	Observation	Climatological Average
Date		
Time		
Temperature		
Barometric Pressure		
Humidity		
Precipitation Type		
Precipitation Amount		
Wind Direction