All About WIND

Wind outside your front door is basically air molecules in motion. Air molecules are made up mostly of nitrogen (about 78 percent by volume), some oxygen (about 21 percent by volume), a bit of water vapor (between 1 and 4 percent by volume near the surface of the earth) and other trace elements. Every time we breathe, the air we inhale is composed of about the same combination.

Witness the wind with one of these experiments:
-Wind Streamer
-Wind Sock
-Wind Chime
-Wind Vane
-Anemometer

Try This Outside Your Front Door

This is a simple experiment for young people to learn basic principles about how to measure the direction of wind.

Here's what you'll need to make a wind streamer:
Recycled Plastic plate
Recycled Plastic Bag (for Streamers)
Scissors
Hole puncher
Permanent Marker
Crayons

Here's how to make the wind streamer:
1. Design a "Windman" face if desired and paste him to the top of the plate. Laminate it or cover in plastic to avoid the rain!
2. Draw a cross on the bottom side of the plate dividing it into 4 parts.
3. Hole punch at each of the four ends of the cross, about ¼" from the edge of the plate (hole punch a few times to make the opening bigger.)
4. Cut eight plastic bag streamers 3 feet each in length.
5. Place two streamers together and Thread them through the hole punch.
6. Tie them to the edge of the plate.
7. Repeat steps 5 and 6 until all 4 holes have streamers tied to them.
8. Write the capital letters N, E, S,W, next to each hole.
9. Lightly paste your colored Windman at the middle of your wind streamer, over the cross. Remember: All of your work is on the bottom flat side of the plate.
10. Record what you observe about the wind.
11. Hold your wind streamer in front of you, with your thumb on top, near the letter "S". Make sure your arm is straight out and the plate is parallel to the ground.
12. Turn so the "N" on your wind streamer is pointing to the north.
13. Watch the wind go to work. Be sure to use recycled items--- you're learning about the environment--- protect and preserve it as you learn!

Here's how to observe the wind streamer: If the crepe paper blows out to the south, the wind is blowing from the north. Watch for the wind in all directions. Write down the time and the direction. What happens if you take your wind measurement near the house? In an open field? On the Ground? At the top of the playground slide? If you move from the front porch to the back yard does the wind direction change?

Wind Sock

Here's what you'll need for a wind sock:
Old shirt sleeve man's XL at least 4 pieces (about 8" each) of sturdy wire (wire coat hanger)
Old Stick (about 3 feet long)
Large nail
Wooden spool (from thread)

Here's how to assemble your wind sock:
1. Form the hanger into a loop about 9" in diameter. Attach the 4 stings to this loop at 4 points of equal distance around the loop.

2. Use the shirt sleeve as the sock.
3. Twist the exposed ends of wires to the spool. Place the nail through the spool so that the spool may pivot freely on the nail, and hammer the nail into the end of the long stick.

4. Place stick outdoors; nail it to a tall post so that the sock may swing freely with the wind.

Here's how to observe the air changes with your wind sock: The large end of the sock will catch the wind, so that the small end will point away from the direction from which the wind is blowing, the sock will droop if there is not enough wind to keep it extended. Observe the position of the sock at different times for changes in the direction and force of the wind. Windsocks are used chiefly at airports to indicate wind direction for takeoffs and landings. They help the pilots select the proper runway, so that they can take off and land into the wind. Be sure to use recycled items--- you're learning about the environment--- protect and preserve it as you learn!

Wind Chime

This is a simple project to help young people learn about wind speeds. The wind blows gently sometimes and, other times it roars! This project will let you both hear and see the wind blow. Recognizing the wind can help you predict changes in the atmosphere.

Here's what you'll need to make the wind chime:
Sturdy tree branch (find one that's fallen off the tree if possible)
Items like bolts, washers, screws, nails, peanut butter jar lids, large buttons, old dangly earrings
fishing line, cut five strands different but close in length (9-11 inches)
Scissors

Here's how to make the wind chime:
1. Attach one end of a piece of fishing line to each metal and/or shiny object.
2. Attach the other end of each of the fishing lines to the tree branch so, the objects are hanging freely, approximately ½ inch apart.

3. Tie two additional pieces of fishing line of the same length to each end of the tree branch to use to hang your wind chime from your favorite tree.
Here's how to record what you observe about the wind: When the wind blows, the movement of the wind causes the objects to move. When the objects hit each other, you can hear the wind blow. Write down what the wind feels like you when the chimes are both soft and loud. Be sure to use recycled items--- you're learning about the environment--- protect and preserve it as you learn!

Wind Vane

Here's what you'll need to build the wind vane:
Wire coat hanger
Wire cutters
2 drinking (recycled) straws
Plastic tape
Scissors
Poster board and permanent markers
2 recycled Styrofoam pieces from fast-food dish trays
12-inch ruler
12-inch dowel or other rod
Pen cap Old Broomstick or mop
handle Drill (for parental use only)
Small basic Compass

Here's what you need to do to build the wind vane:
1. Cut out the straight, bottom side from a wire coat hanger. Poke a hole in the middle of each of the two drinking straws and slide them onto the wire, setting them at right angles to each other about 5 inches from one end of the wire. Secure them with tape. Cut four 2-inch squares from the poster board, label one N, one S, one E, and one W, and then tape them onto the straws to indicate the four compass points.

2. From one piece of Styrofoam, cut a triangle 2 ½ inches at the base and 3 inches high. From the other piece, cut a rectangle 3 ½ by 5 inches. Draw a mid-line the length of the rectangle, mark the 3 ½-inch point on the line and use that point as the tip of a triangle that you will then cut out of the end of the piece, making the tail of your arrow. Tape the tip and the tail of the arrow to the dowel.

3. Tape the arrow to the pen cap, a bit closer to the tip than to the tail. The tip of the cap should be attached to the underside of the dowel, as it will be the pivot point for the wind vane.

4. Drill a hole in the end of the broomstick and insert the wire into it. Find a spot for your wind vane out in the open, and either set the broomstick into the ground or mount it on a suitably strong object.

5. Using your compass, orient the straws to their respective directions, and set the pen cap and arrow on the end of the wire.

6. Explain to your kids about reading a wind vane: Because the tail of the arrow is more heavily weighted than the tip, the arrow will point in the direction from which the wind is blowing. If the arrow points south, it is a south wind because wind is identified according to the direction it is blowing from.

Here's how to observe the wind with your wind vane:
A wind vane is one of the most useful tools for forecasting because certain winds tend to bring good weather while others often bring rain. Once your wind vane is up and running, a glance at it will give you an important clue about what to expect: winds from the west are likely to usher in fair weather, while winds mainly from the east are likely to bring unsettled conditions. Be sure to use recycled items--- you're learning about the environment--- protect and preserve it as you learn!

Anemometer

Here's what you'll need to make the anemometer:
Five recycled 3 ounce paper Dixie cups
Two recycled straight plastic soda straws
A straight pin
Scissors
Paper hole punch
Small stapler
Sharp pencil with an eraser

Here's what you do to make the anemometer:
1. Start with the four of the Dixie cups. Using the paper punch, punch one hole in each, about a half inch below the rim.

2. 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. This will be the center piece of your anemometer

3. With one of the four cups, 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. These are your side pieces.

4. 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.

5. 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.

Here's how to record what you observe about the wind:
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 illustration. The velocity at which your anemometer spins is not the same as actual wind speed.) (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.) Be sure to use recycled items--- you're learning about the environment--- protect and preserve it as you learn!

The History of Measuring Wind

In 1450, the Italian art architect Leon Battista Alberti invented the first mechanical anemometer. This instrument consisted of a disk placed perpendicular to the wind. It would rotate by the force of the wind, and by the angle of inclination of the disk the wind force momentary showed itself. The same type of anemometer was later re-invented by Englishman Robert Hooke who is often mistakenly considered the inventor of the first anemometer. The hemispherical cup anemometer (still used today) was invented in 1846 by Irish researcher, John Thomas Romney Robinson and consisted of four hemispherical cups. The cups rotated horizontally with the wind and a combination of wheels recorded the number of revolutions in a given time. In a modern day anemometer, an electrical device records the revolutions of the cups and calculates the wind velocity.

Wind Extremes

Fastest surface wind speed:
231 mph, Mount Washington, New Hampshire: April 12, 1934.

Fastest tornado winds:
286 mph, Wichita Falls, Texas; April 2,1958.

Fastest Chicago wind speed:
87 mph, February 1894

Test Your Wind Knowledge

A. Chicago is sometimes referred to as the _____ city.
B. Wind chill makes it feel _____.
C. Meteorologists measure wind speed using a _____.
D. Winds are measured in _____ on land and in _____ on the water.

Answer Key:
A Windy
B Colder
C Anemometer
D mph, knots

Note:
All of these experiments, encouraging recycling while learning about weather, are being presented by Amy Freeze.