Weather Study and Observation Features

Observing weather helps to connect students to their surroundings and is an excellent way to build fun and learning into the curriculum. Providing areas on your school grounds to study weather can be easy. You don't need formal weather equipment — homemade equipment will do the job nicely.

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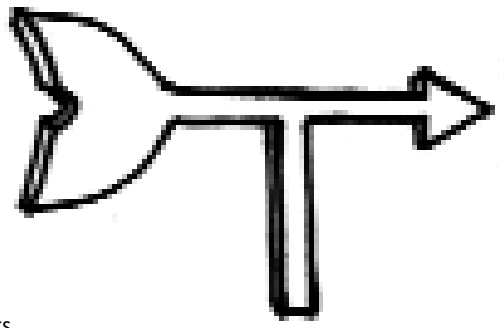
Types of Weather Study and Observation Features

1 Wind Vane

A wind vane is also called a weather vane. It is a tool for measuring wind direction and it is typically shaped like an arrow that points in the direction the wind is coming from. It is able to do this because the other end of the arrow is wide and catches the smallest breeze, which then turns the arrow until it catches both sides of the wide end equally.

Materials Needed

- pencil and paper
- scissors
- cardboard
- compass
- plastic soft drink bottle
- plastic drinking straw
- shallow pan filled with rocks
- felt marking pen



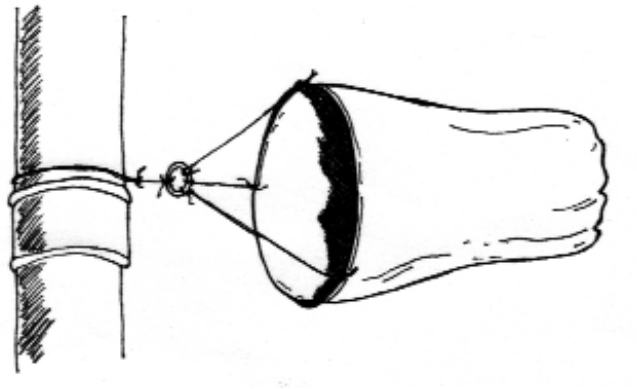
Building Your Wind Vane

- Cut an arrow with a tab (near the centre of the arrow) from the cardboard.
- Bend the tab slightly and place it in one end of the straw.
- Put the other end of the straw in the bottle.

- Place the bottle in the pan with rocks, removing some of the rocks so the bottle sits evenly. Fill around the bottle with the extra rocks so it won't be blown over.
- Use your compass to find north and then mark the four sides of the bottle N, E, S, W with the felt pen.
- Set your weather vane in a high place such as the top of a shade shelter or tool shed. Make sure it does not wobble or tilt and that it catches the slightest breeze.
- Watch your weather vane and describe how it works. Test it on windy days and when there is just a light breeze and compare the differences.

2 Wind Sock

A wind sock will also help you tell the direction of the wind on your school grounds. The wind will fill up the plastic liner and show you the direction the wind is coming from.



Materials Needed

- plastic bin liner
- string
- curtain ring
- compass

Building Your Wind Sock

- Tie three lengths of string to a plastic bin liner at even intervals.
- Secure the strings to a curtain ring. Make sure the hole of the curtain ring faces the same direction as the opening of the plastic liner.
- Attach another length of string to the curtain ring and tie the string from the curtain ring to a post.

3 Stevenson's Screen

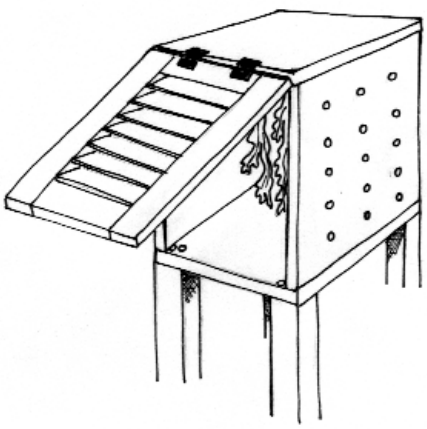
A Stevenson's screen will help you measure and observe air moisture and humidity.

Materials Needed

- wooden box
- four wooden posts
- louvre panelling, cut to fit the size of the opening on the wooden box
- two galvanized hinges
- galvanized screws
- screw driver
- nails
- hammer
- saw
- tape measurer
- drill
- seaweed
- hygrometer or weather stick

Building Your Stevenson's Screen

- Attach the posts to the wooden box (with the open facing forwards) by nailing from the inside of the box.



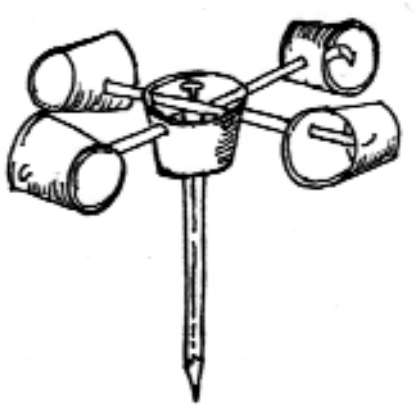
- Attach long strips of seaweed to the inside top panel of the box so they hang down. The seaweed will expand and shrink with the moisture levels in the air. Or use a hygrometer or weather stick and store it inside the box.
- Measure the open face of the box and cut the louvre panelling to fit.
- Attach the panelling to the outside top panel of the box using the hinges.
- Drill holes in regular intervals along the two sides of the box to allow air and moisture through.

4 Anemometer

Determine the wind speed on your school ground by creating an anemometer in your garden.

Materials Needed

- five, three-ounce paper Dixie cups
- two straight plastic soda straws
- one straight pin
- scissors
- paper punch
- small stapler
- sharp pencil with an eraser



Building Your Anemometer

- Take four of the Dixie cups. Using the paper punch, punch one hole in each, approximately 1.5 centimetres (half inch) below the rim.
- Take the fifth cup and punch four equally spaced holes approximately one centimetre (quarter inch) below the rim. Then punch a hole in the centre 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 step for another one-hole cup with the second straw.
- 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 sure that the cup faces in the opposite direction from the first cup at the other end of the straw. Repeat this step 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 (either clockwise or counterclockwise) around the centre 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 centre cup and push the pin into the end of the pencil eraser as far as it will go.

Measuring Wind Speed

Your anemometer will rotate at the same speed as the wind. It does not need to be pointed into the wind to spin. To determine wind velocity, measure the number of revolutions per minute of your anemometer, calculate the circumference of the circle (in feet) made by the rotating cups and then multiply the revolutions per minute by the circumference (in feet per revolution). This will give you the velocity of the wind in feet per minute.

Provide other wind collection devices on your school grounds, such as wind chimes and wind-pipes.

5 Rain Gauge

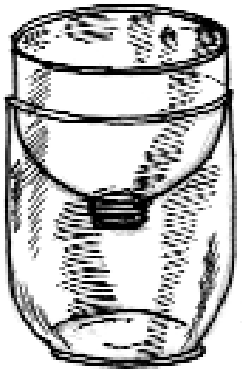
Collect and measure the rainfall at your school by building a rain gauge.

Materials Needed

- plastic pop bottle
- scissors

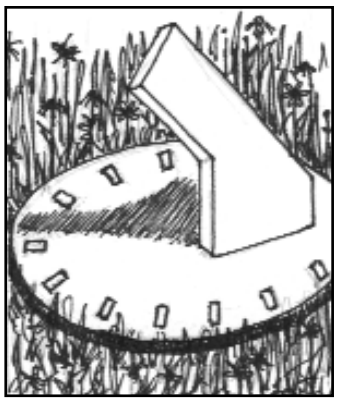
Building Your Rain Gauge

- Cut off the top third of the plastic pop bottle and invert it into the bottom of the bottle.
- Secure or partially bury your rain gauge in the ground to prevent it from blowing away. Make sure the top funnel is 30 centimetres above ground so rain cannot splash into it from the ground. This could lead to inaccurate records.



6 Sundial

Tell what time it is on your school grounds by creating a sundial. A sundial measures time by casting a shadow from a triangular indicator (gnomon) onto a dial that is marked at hourly intervals.

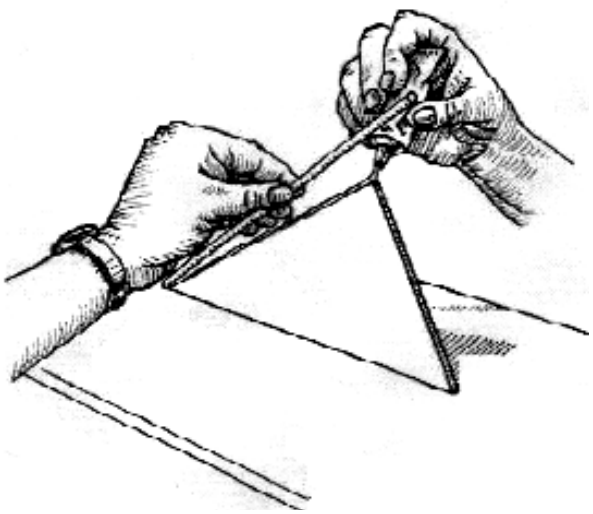


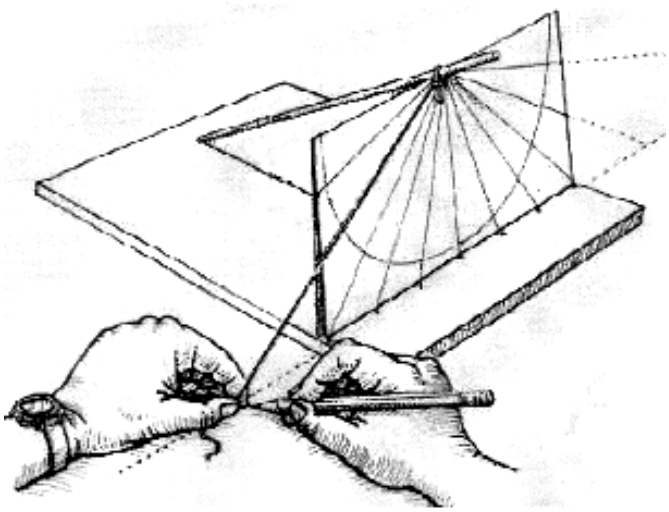
Materials Needed

- smooth piece of wood or stone
- cardboard, wood or plastic
- paper
- pencil
- string
- protractor
- wood dowel or small rod
- ruler
- scissors

Creating Your Sundial

1) Select a smooth material for the face of your sundial (e.g. wood or a flat stone).
2) Create the gnomon (indicator) for your sundial using a strong piece of cardboard, wood or plastic. Make sure the angle of your gnomon is equal to the latitude of the location of your sundial (the latitude for your school).
3) Place the gnomon in the centre of the sundial face.





4) Attach a thin rod (e.g. small wood dowel) along the top edge of the gnomon.
5) Create a paper protractor by drawing a semi-circle on the bottom half of stiff paper and marking out angles of 15 degrees with a protractor. Fold back the top half of the paper.

6) Place the paper on the face of your sundial so it rests against the end of the gnomon with the angles facing away from the style.
7) Attach one end of cord around the rod and stretch it in line with each 15-degree line, marking out each point to left and right across the dial face. Temporary extensions to the left and right of the dial face will be needed, where points can be added in line with the wider angles.
8) Remove the paper protractor and with a straight ruler, draw in the hour lines of the sundial, joining the marked points to the point of emergence of the sloping gnomon.
9) Place your sundial in a garden area or designated spot on the school grounds, making sure it is facing true north.

did you *know...*

All shadows at solar noon point to the true north pole in the northern hemisphere and the true south pole in the southern hemisphere

7 Solstice Shadow Measuring

The elevation of the sun in the sky can be observed, measured and recorded by looking at a student's shadow at solar noon. This works best if you start at a solstice and repeat the observation on the same date each month.

Materials Needed

- string
- protractor
- pencil and paper for recording findings
- chalk to mark dates and solstices on the stone
- designated stone area where shadows can be measured

North Shore Elementary School

Measuring Solstice Shadows

- Have a student that is approximately 1.2 metres (four feet) tall stand in the sun at solar noon looking at their shadow. Or, you can use a 1.2 metre board.
- Measure the length of their shadow from their heels.
- Run a string from the top of their head to the end of the shadow of their head.
- Use a protractor to measure the angle where the string meets the ground and record the angle.
- Repeat the measurement with the same student at the same time of day once a week for a month.
- Try variations. Compare the difference between angles for the shortest and tallest person in the class. Compare the difference in the angle when measured at different times of the day.
- Record each student's solar noon shadow at the same date each month, compare the recordings and discuss what is causing the change.

Creating Your Solstice Shadow Measuring Area

- Designate a section of asphalt surface on the playground for your solstice shadow measuring. Or, place light coloured stones in your garden area and arrange them in a semi-circle large enough for your student's shadows to be observed at different times of the day and year.
- Mark the solstice periods on the asphalt or stone area with chalk or paint. Use this as a guide when measuring shadows.

Where to **go** *from here?*

Sources for this fact sheet

Keaney, Brian and Bill Lucas, eds. *Bright Ideas: The Outdoor Classroom*. Leamington Spa, Warwickshire: Scholastic Publications Ltd., 1992.

The Franklin Institute Online. "Windy Things to Make." An online article: http://sln.fi.edu/learning

Organizations and Web sites

British Sundial Society: www.sundials.co.uk/projects.htm#hdial2
Pipehenge, New Zealand: www.pipehenge.com
Skywatchers: www.weatheroffice.com/sky: 1-888-758-0000

Example projects

The Ecology Garden, Peterborough, Ontario: (705) 745-3238
Altadore Elementary School, Calgary, Alberta: (403) 777-6910
North Shore Elementary School, Keene, Ontario: (705) 295-6898