Weather – Grades 3-5

Objective: The objective of this lesson is to observe, measure, and record changes weather.

Materials (provided by CSM):

- Thermometer Activity
  - Tap water
  - Rubbing alcohol (do not drink this)
  - Clear, narrow-necked plastic bottle (11-ounce water bottles work well)
  - Food coloring
  - Clear plastic drinking straw
  - Modeling clay
- Rain Gage Activity
  - 1 Liter pop bottle
  - Scissors
  - Tape
  - Marker
- Wind Vane Activity
  - Round plastic drinking cup with lid, or round food storage container with lid
  - Pebbles or sand
  - Sharpened pencil
  - Drinking straw (a straight one, no bendies!)
  - Straight pin
  - Poster board or card stock paper
  - Black permanent marker

Questions:

What can we use to measure weather?
Thermometer-measures the temperature of air
Rain Gauge-measures rainfall
Wind Vane-measure the winds direction

Discussion:

A thermometer is an instrument that measures the temperature. Temperature is measured in a scale called Fahrenheit (by most people in the United States) and in Celsius or Centigrade (used by scientists and by people in many other countries). The point where water freezes is 32 degrees Fahrenheit (F for short) and 0 degrees Celsius (C). The point where water boils is 212 degrees F and 100 degrees C. If you want to know how to convert from F to C or from C to F,

$$°C = (°F - 32) \times 5 / 9$$

$$°F = (°C \times 9 / 5) + 32$$

Some scientific thermometers use the Kelvin scale, where 0 Kelvin is called absolute zero - a place where there is no movement of any parts of matter, where substances have no thermal energy. It's about minus 273.15 degrees C (below 0° C) or 459.67 degrees below 0° F. Scientists have never been able to measure anything at absolute zero, though they have gotten very close.

Thermometers help us know what the weather will be like. If it will be 90°F outside, we're not going to put on a winter coat. Or if it's below zero, we won't be wearing shorts.

Here's a way to show how a simple thermometer works.

Materials:

- Rain gauges measure liquid precipitation - rain.
- Explain that rain gauges come in several forms. Ask the students if they have a rain gauge at home. If they do, ask them to explain what it looks like and how it works (the typical "home" rain gauge is a plastic cylinder with a ruler etched into it that must be emptied after each use).
- The WeatherBug "Tipping Bucket" Rain Gauge is a fancier rain gauge. If you have one available to bring with you, unscrew the top and bottom pieces to expose the "tipping bucket" to show students how it works: each "bucket" holds 0.01" of water (anything less is called a "trace") so every time the bucket fills up and tips over, 0.01" of rain is recorded. The nice thing about the tipping bucket rain gauge is that it empties itself!
- Interesting side note: the "approved" way to measure snowfall is to use a ruler and measure the snow depth in 10 places and take the average – a great math project in itself!

A weather vane is an instrument for measuring wind direction. It is a simple instrument consisting of an arrow, or any figure, mounted on a rod. This rod moves in the direction of the wind when there is breeze. The front part of the vane is more or less pointed and the back end is wide so that even the slightest breeze will move the vane. The arrow turns until the wind is equally distributed on either side of the weather vane, making the front part indicate the exact direction of the wind. Wind vanes are placed in open and high places to catch the wind. \Article Source: http://EzineArticles.com/69324

Thermometer Activity:

Procedure:
Pour equal parts of tap water and rubbing alcohol into the bottle, filling about 1/8 to a 1/4 of the bottle.
Add a couple of drops of food coloring and mix.
Put the straw in the bottle, but don't let the straw touch the bottom (**DO NOT DRINK THE MIXTURE**).
Use the modeling clay to seal the neck of the bottle, so the straw stays in place.
Now hold your hands on the bottle and watch what happens to the mixture in the bottle.

EXPLANATION:

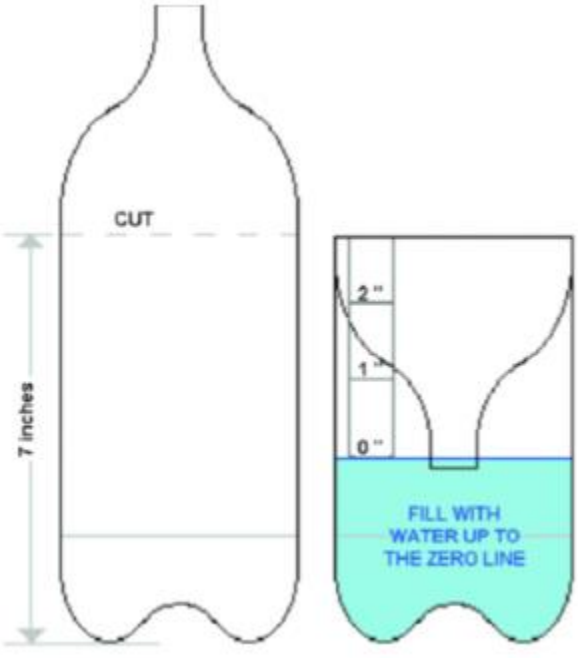
Why does this happen? Just like any thermometer, the mixture expanded when it was warmed. This made the mixture no longer fit in the bottom of the bottle. As the alcohol expanded the colored mixture moved up through the straw. If the bottle were to get extremely hot, the mixture would have come up through the top of the straw.

Rain Gauge Activity:

Procedure:

1. Cut off the top of the bottle with scissors
2. Insert the top into the base (it will act as a funnel)
3. Tape the two exposed edged together
4. Stick a scale label to the bottom. The 0 line should be a few inches above the base.
5. Fill the rain gauge with water to the 0 mark (to prevent the gauge from tipping over.

Ruler segments can be found

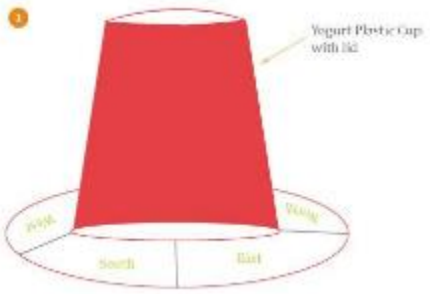


http://achieve.weatherbug.com/brainstorm/activities/makingaraingauge.pdf

Although we do not have an activity for thunder, it is a good idea to briefly talk about it. Thunder is caused by lightning. When a lightning bolt travels from the cloud to the ground it actually opens up a little hole in the air, called a channel. Once then light is gone the air collapses back in and creates a sound wave that we hear as thunder. The reason we see lightning before we hear thunder is because light travels faster than sound!

Wind Vane Activity:

Procedure:

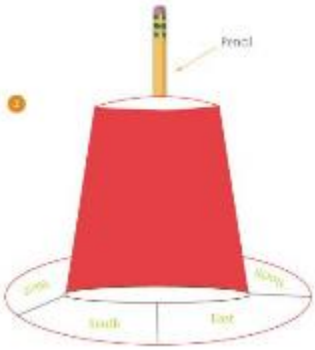
1. 

2. Start by putting the lid on the plastic container, and turn the container upside down. Trace around the lid, and then make another circle around the outer edge, at least 2 inches wider than the first one.

3. Use a ruler to divide the lid in half along its diameter, and then divide each of those halves in half. Have your child write the words for the four parts of the compass along the outer edge of each of the four sides. Moving from the top, clockwise, she should write “North, East, South, and West.”

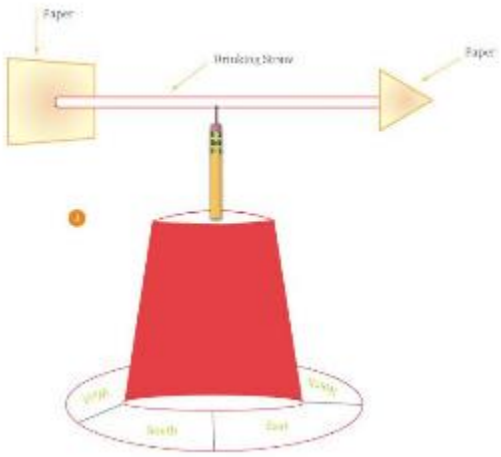
4. Now open the container. Stick a blob of modeling clay or putty on the bottom of the container, and then fill the remainder to the top with pebbles or sand. Snap the container lid on and tape it, if necessary, to keep it secure.

5. Glue the container, upside down, onto the cardboard compass base you just made.

6. 

7. Take the sharpened pencil, and poke it through the center of the plastic container so that the eraser is on top, and the point is held by the putty and sand.

8. Now, cut a broad triangle and a square, both about 3 inches across from your construction paper. Cut a slit in each end of the straw. Slide the triangle onto one end and the square onto the other. Use a bit of glue if they seem to slip. Push the pin through the center of the straw and attach it to the top of the pencil eraser. If you flick the straw,



9. or blow on either end, it should move freely.

Take your wind vane outside to a place where the wind is not highly obstructed. Help your child find north, south, east, and west on a real compass, and line up the wind vane accordingly. Wait for the next breeze; the arrow will point to where it's coming from.