

How To Make a DIY Thermometer for Kids

First, gather your materials:

- Rubbing alcohol, optional
- Water
- Glass bottle – can use a recycled bottle and it doesn't need to have its own lid
- Clear straw
- Measuring cup
- Sticky tack
- Red food dye, optional
- Cooking oil, any

The rubbing alcohol is optional because you can just use water in your **DIY Thermometer** – but the rubbing alcohol helps the liquid respond faster to temperature changes.

First, measure how much water it takes for your glass bottle to be completely full to the top. Dump out half of the water and replace that half with rubbing alcohol (if using rubbing alcohol).

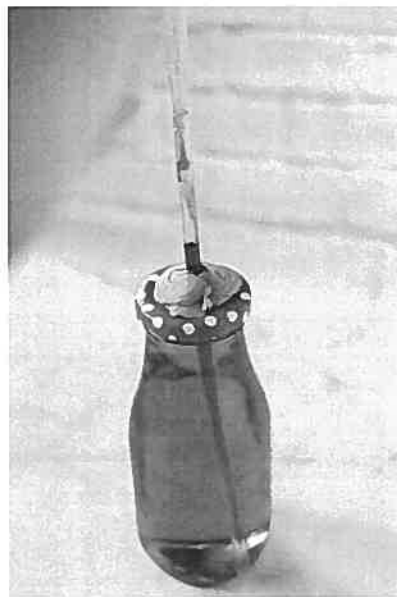
Next, add in the optional red food dye. This will make it easier to see the differences in temperature when the water-rubbing alcohol level rises in the straw, especially because you are going to have a drop of cooking oil on top (which might be hard to differentiate from the water).



Carefully add the mixture to your bottle. You want to ensure that your liquid comes right up to the top of the bottle. Add a few extra drops as needed.

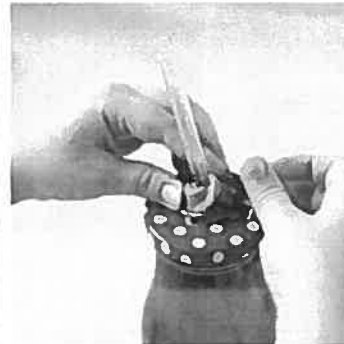
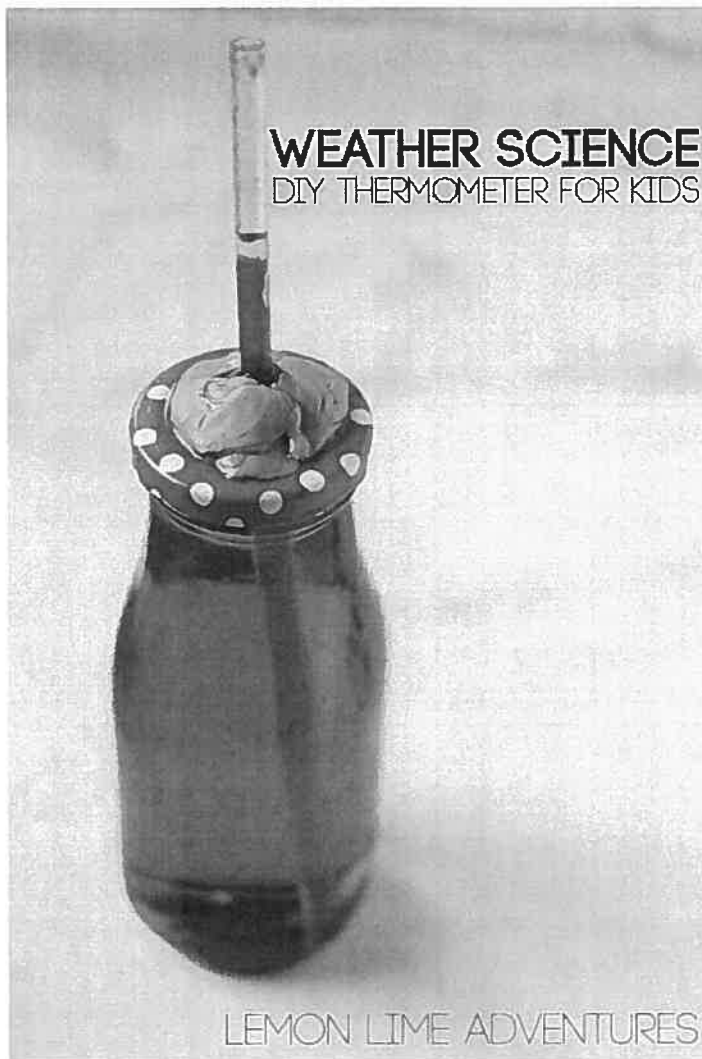


Insert the straw and secure a firm seal around the opening of the bottle. We used a lidded milk bottle and then added some sticky tack to really create a good seal around the straw. If air is able to get at the liquid, it will skew the accuracy of the thermometer, and slowly cause it to evaporate!



Next, use a pipette or eye dropper to add enough extra liquid mixture to have about 2 inches of the thermometer liquid in your straw. Let it set for about an hour and then check it again to ensure it's still there and hasn't settled back into the bottle. (If it has, fill it back up and wait another hour.)

Once you're positive that you have liquid staying in the straw, add a small drop of cooking oil to the straw to act as a "seal" and prevent the thermometer liquid from evaporating.



Leaving the straw like this will allow you to tell when the temperature in a room is hotter or colder than normal, but if you'd like to calibrate your thermometer, pair it with a REAL thermometer and place it in different spots throughout your house. Use tiny hair elastics or a thin-tip permanent marker to show where the different temperatures occur.



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How to Make an Anemometer

Materials Needed:

- five 3 oz. plastic cups
- two plastic soda straws
- one pencil (with unused eraser)
- single-hole paper punch
- scissors
- tape
- one push-pin
- permanent magic marker



Step 1

Take four of the plastic cups and punch one hole in each, about $\frac{1}{2}$ inch (1.5 cm) below the rim.

Step 2

Take the fifth cup and punch two holes in it, directly opposite from each other, about $\frac{1}{2}$ inch (1.5 cm) below the rim. Now punch two more holes in the cup, each $\frac{1}{4}$ inch (1 cm) below the rim that are equally-spaced between the first two holes.

Step 3

Using the push-pin and the scissors, make a hole in the center of the bottom of the cup with four holes in it. The hole should be large enough that the pencil can fit easily through it.

Step 4

Slide one of the straws through the hole in one of the cups that has only one hole in it. Bend the end of the straw that is inside the cup about $\frac{1}{2}$ inches (1.5 cm) and tape it to the inside of the cup.

Step 5

Place the other end of the straw through two of the holes in the fifth cup and then through the hole in one of the other cups. Tape the end of the straw to the inside of the cup as you did earlier, making sure that the openings of the two cups face opposite directions.

Step 6

Repeat steps 4 and 5 with the remaining two cups, sliding the straw through the remaining two holes in the fifth cup. Make sure that the opening of each cup faces the bottom of the cup next to it (in other words, no two openings should be facing each other). Each of the four cups should be facing sideways.

Step 7

Insert the pencil with the eraser facing up through the bottom of the fifth cup. Carefully push the pin through the two straws and into the eraser on the pencil.

Step 8

Take the permanent magic marker and draw a large **X** on the bottom of one of the cups.

Your anemometer is now ready to use! Take it outside and hold it in front of you in an open area where the wind is blowing.

Look at the **X** on the bottom of the cup as it spins around. Count the number of times it spins around (revolutions) in 10 seconds. Use the table below to estimate the wind speed.

| Revolutions in 10 seconds | Wind Speed in Miles per Hour (mph) | Wind Speed in Kilometers per Hour (kph) |
|--------------------------------------|---|--|
| 2 - 4 | 1 | 2 |
| 5 - 7 | 2 | 3 |
| 8 - 9 | 3 | 5 |
| 10 - 12 | 4 | 6 |
| 13 - 15 | 5 | 8 |
| 16 - 18 | 6 | 10 |
| 19 - 21 | 7 | 11 |
| 22 - 23 | 8 | 13 |
| 24 - 26 | 9 | 14 |
| 27 - 29 | 10 | 16 |
| 30 - 32 | 11 | 18 |
| 33 - 35 | 12 | 19 |
| 36 - 37 | 13 | 21 |
| 38 - 40 | 14 | 23 |
| 41 - 43 | 15 | 24 |
| 44 - 46 | 16 | 26 |
| 47 - 49 | 17 | 27 |
| 50 - 51 | 18 | 29 |
| 52 - 54 | 19 | 31 |
| 55 - 57 | 20 | 32 |

DIY Rain Gauge

Grade Level: 4th to 8th; **Type:** Meteorology

Objective:

Students make their own rain gauge to measure rainfall.

Research Questions: How is rainfall measured?

Materials:

- Empty two-liter plastic bottle
- Scissors
- A few handfuls of clean pebbles, gravel, or marbles
- Masking tape
- Water
- Ruler
- Permanent marker
- Rainy weather
- Paper and pencil

Experimental Procedure:

Carefully use the scissors to cut the top of the bottle off at the wide part just below where it begins to get narrow.

Put the pebbles in the bottom of the bottle—these will help keep it from getting blown over if it's windy.

Turn the top of the bottle upside down—make sure there's no cap on it! It's going to act like a funnel—and place it in the bottom part of the bottle, pointing downward. Line up the cut edges and tape them together so the top part is held firmly in place.

Use a long piece of tape to make a straight vertical line from the top edge of the bottle to the bottom. Use the marker to draw a line on the vertical piece of tape just a little above the top of the pebbles. This will be the bottom of your rain gauge.

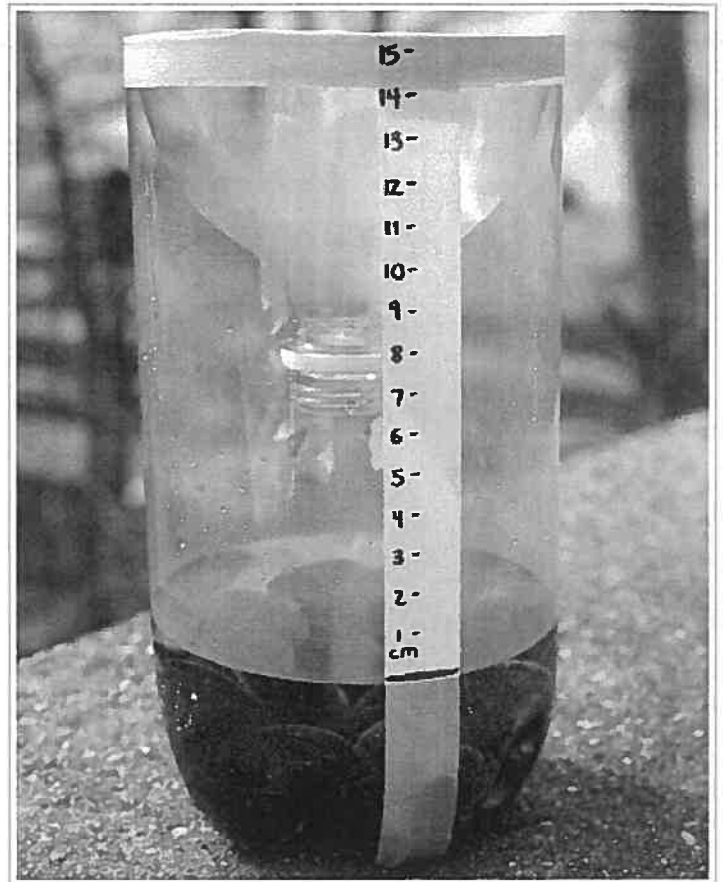
Set the ruler against the vertical tape so that the "0" line lines up with the bottom mark. Use the marker to mark every quarter-inch (or, if you want to get fancy, every eighth-inch) along the piece of tape. Then label the inches from bottom to top. (Alternatively, you can mark centimeters and half-centimeters instead.)

Set the bottle on a level surface and pour some water in until it reaches the bottom mark. Your rain gauge is now ready to go!

Put the rain gauge outdoors—you'll need to pick a really good spot! You want somewhere level that's open to the sky and that's not likely to get too windy, where the gauge isn't likely to be disturbed. There shouldn't be anything hanging over the gauge that could either block any rain or make extra raindrops drip into the bottle (like a tree or a power line or the edge of a roof).

Pay attention to the forecast. On a day that you're likely to get rain, make sure the water in the bottom hasn't evaporated below your bottom mark; if it has, refill it to that mark.

24 hours later, if it has rained, check your gauge and see how high the water is now. That's how much rain has fallen in the last day! On your piece of paper, make a note of the date and the amount of rain. Then read the newspaper or go online and find out the official amount of rainfall in your area for the day and make a note of it—see how closely your figure matches the official one!



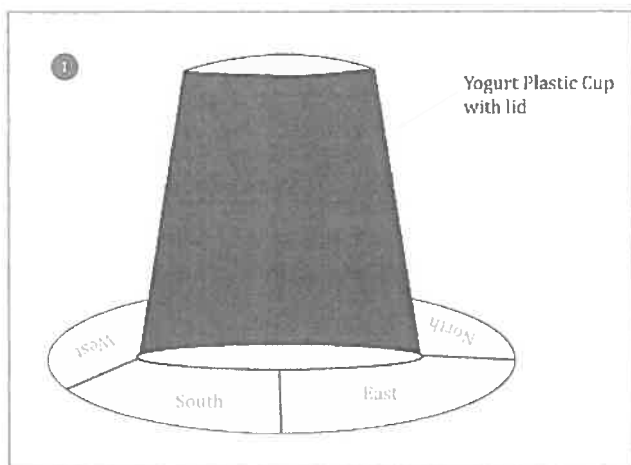
How to Make a Wind Vane

Breezy weather? Help your young scientist relate it to weather across her community and state, and make a wind vane for kids—a simple version of a classic scientific measurement tool—in the process!

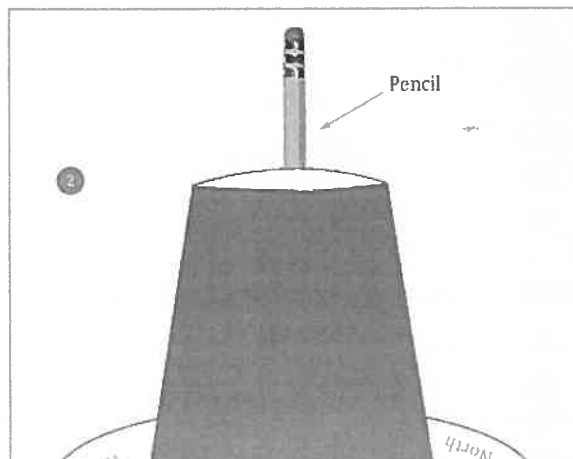
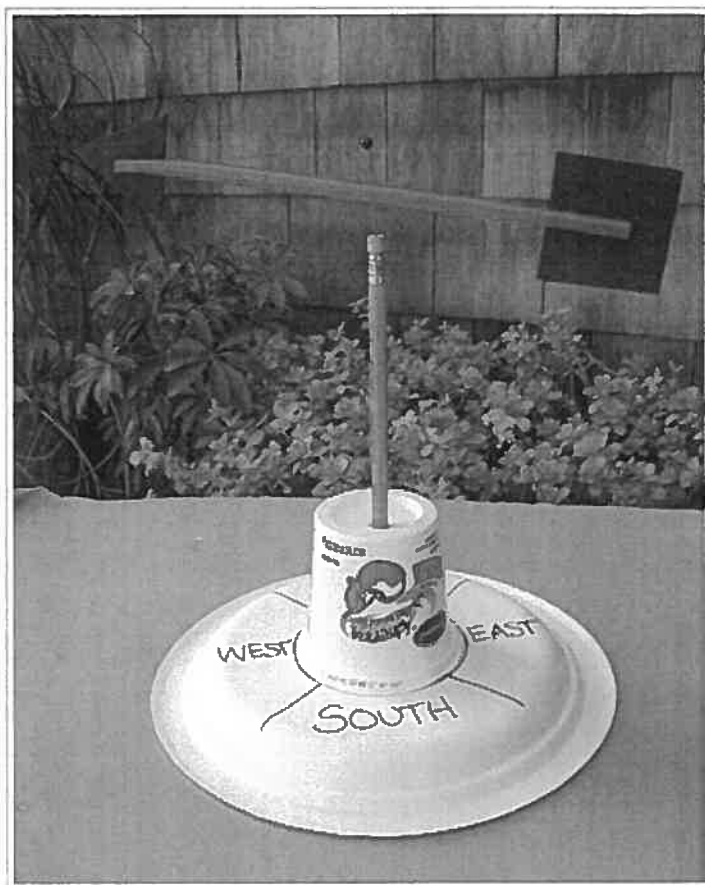
What You Need:

- 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
- Compass

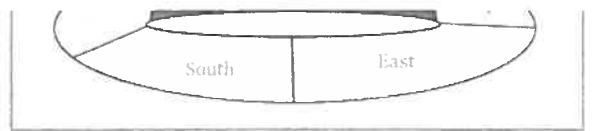
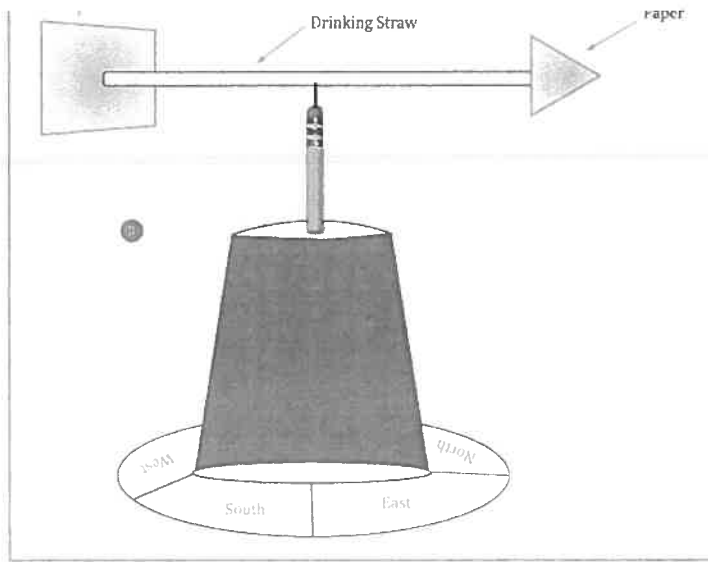
What You Do:



1. 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.
2. 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."
3. 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.
4. Glue the container, upside down, onto the cardboard compass base you just made.
5. 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.
6. 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, or blow on either end, it should move



freely.
7. 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.

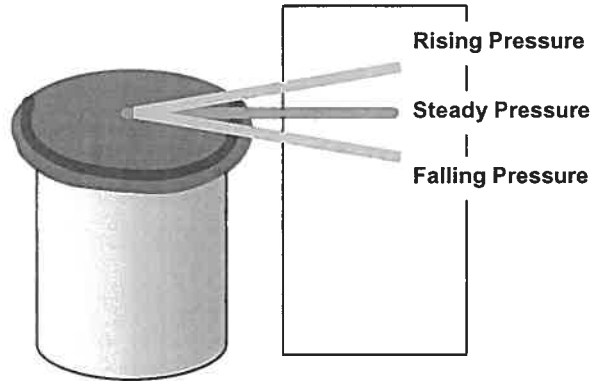


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How to Make a Barometer

Materials Needed:

- small glass jar or tin can
- large (12") round balloon
- rubber band
- scissors
- tape
- small stirring stick
- 5" x 7" index card



Step 1

Use the scissors to cut the top of the balloon off.

Step 2

Wrap the top of the balloon tightly around the opening of the jar or can and seal it with the rubber band. Try to get the balloon as tight as possible and make sure that the rubber band is tight enough so that no air will get in.

Step 3

Tape the stirring stick to the center of the stretched out balloon so that one end of the stick points away from the jar or can.

Step 4

Place the jar or can next to a wall. Tape the index card to the wall so that the end of the stick is pointing to it.

Step 5

Make a mark on the index card next to where the stick is pointing. You may wish to label the mark with the date and time.

Step 6

Look at the card each day and see if the stick points above or below where it did the day before. If it points **above** the previous day's mark, the pressure is **rising**. If it points **below** the previous day's mark, the pressure is **falling**.