



Wacky Weather



4-H Pledge

I pledge:

My **HEAD** to clearer thinking,
My **HEART** to greater loyalty,
My **HANDS** to larger service,
My **HEALTH** to better living,
For my club, my community,
my country and my world.



4-H Motto

Learn To Do By Doing

Leadership Development Pillars

Community Engagement & Communications

Science & Technology

Sustainable Agriculture & Food Security

Environment & Healthy Living

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Welcome to 4-H Saskatchewan's Wacky Weather Kit!

This kit is designed to teach 4-H members about wind speed and terrariums in a fun and interactive way. This activity kit will go over all the projects and information you will need to learn about "Wacky Weather." From building your own anemometer to creating an enclosed terrarium, this kit has a lot to offer.

Your "Wacky Weather" kit should include:

- Small paper cups
- Thin wooden dowels
- Clear plastic container
- Potting soil
- Small rocks
- Seeds

Please note: There are some items you will need to supply yourself. These are:

- Hole punch
- Scissors
- Duct tape
- Medium size empty water bottle
- Stopwatch
- Small indoor plants (optional)
- Decorations or toys for terrarium (optional)



Did you know?

A thunderstorm can produce 160 km/h winds!

Anemometers

An anemometer is an instrument that measures wind speed and wind pressure. Anemometers are important tools for meteorologists, who study weather patterns. They are also important to the work of physicists, who study the way air moves.

The most common type of anemometer has three or four cups attached to horizontal arms - this will be the type we will be creating! The arms are attached to a vertical rod. As the wind blows, the cups rotate, making the rod spin. The stronger the wind blows, the faster the rod spins. The anemometer counts the number of rotations, or turns, which is used to calculate wind speed. Because wind speeds are not consistent - there are gusts and lulls - wind speed is usually averaged over a short period of time.

Some other types of anemometers are:

- One that counts the revolutions made by windmill-style blades. The rod of windmill anemometers rotates horizontally.
- A hot-wire anemometer takes advantage of the fact that air cools a heated object when it flows over it. In a hot-wire anemometer, an electrically heated, thin wire is placed in the wind. The amount of power needed to keep the wire hot is used to calculate the wind speed. The higher the wind speed, the more power is required to keep the wire at a constant temperature.
- Wind speed can also be determined by measuring air pressure. (Air pressure itself is measured by an instrument called a barometer.) A tube anemometer uses air pressure to determine the wind pressure, or speed. A tube anemometer measures the air pressure inside a glass tube that is closed at one end. By comparing the air pressure inside the tube to the air pressure outside the tube, wind speed can be calculated.
- Other anemometers work by measuring the speed of sound waves or by shining laser beams on tiny particles in the wind and measuring their effect.

Real world applications of anemometers:

- Weather stations - they help indicate a change in weather patterns for pilots, engineers and climatologists
- To make objects aerodynamic - aerospace engineers and physicists use them to measure the rate and direction of change in the position of an object (the wind speed around cars, planes and spacecraft)



SUPPLIES:

* - included in kit

- 5 small paper cups *
- Hole punch
- Scissors
- Duct Tape
- 3 thin wooden dowels *
- Medium size empty water bottle (may need to weigh down with sand)
- Stopwatch

DIRECTIONS:

1. Use the hole punch to make a hole in the side of four of the paper cups
2. Use the hole punch to make four holes spaced evenly around the rim of the last cup. This will be the centre of anemometer.
3. Slide two of the wooden dowels through the holes in the centre cup. They should cross in an "X".
4. Insert the ends of the dowels into the holes of the other cups and tape them into place. Make sure the cups are all facing the same direction.
5. Take the last wooden dowel and make a hole in the bottom of the centre cup.
 - a. Artistic Consideration: Make the top of your wooden dowel stick out a bit. Consider attaching a little piece of cloth or paper so it looks like a flag.
6. Push the dowel up until it meets the "X" and tape everything together. This will be your rotation axis.
7. Put the centre dowel into an empty water bottle and begin testing.
8. You may need to weigh down your water bottle – consider filling it partially with sand, or putting it in between two heavy objects to anchor it into place.

HOW TO CALIBRATE YOUR ANEMOMETER:

- On a windless day, have an adult drive you down the street at 10 km / hour.
- Hold the anemometer out of the window and count the number of rotations in 30 seconds.
- However many times your anemometer spins in 30 seconds will correspond to wind blowing at 10 kilometres per hour.

**What causes wind?**

It is caused by differences in air pressure. Air rushes from high pressure areas to lower ones.

Terrarium

A terrarium is a miniature garden, usually in a sealed container, like a bottle or jar! When they are sealed, most terrariums are fully functioning plant ecosystems - they are mostly self-sustaining, with the plants watering themselves through condensation and transpiration.

Terrariums first gained popularity in Victorian London, where a botany accident created the first one. This gave people in a colder climate the ability to enjoy interesting plants not native to their land. Modern day terrariums are usually used for the same purpose - they give people who may live in the city, who don't have space for a garden, a way to enjoy plants!

How do terrariums work?

Closed terrariums are fully functioning ecosystems. They have their own carbon and water cycles within them.

When the sun beats down on the terrarium, it causes moisture to evaporate from the plants and soil. This moisture becomes condensation on the inside surface of the container. Once enough collects, it falls (like rain) back onto the plants below.

The soil provides all the nutrients the plants need to survive. As some plants die, they will decompose into the soil, giving more nutrients to the plants still living.

Types of terrariums

- Closed - These are the classic terrarium. This is the type that will create its own ecosystem within the container.
- Open - These lose features of traditional terrariums. These are best suited to plants that don't require a lot of moisture, such as succulents



Tips for your terrarium:

- Make sure all your plants require similar needs (water, nutrients, etc.)
 - Putting a fern with a cactus will not work, as ferns love moisture and cacti don't like water as much.
- Make sure to watch your terrarium closely at first, to see if you need to change its needs
 - If it is too moist or too dry, your plants will not survive. If it is too moist, leave the lid off for a day.
 - You may need to put it in a sunnier or less sunny place

Members will create either an open or closed terrarium. 'Open' is essentially a potted plant in a glass container so you can see in – it must be watered regularly. 'Closed' is a sealed potted plant that waters itself and demonstrates the water cycle. A terrarium is a low-maintenance way of bringing a little green into your life, and experiencing the water cycle in front of your very eyes.

SUPPLIES:

* - included in kit

- Clear plastic container *
- Potting Soil *
- Small Rocks *
- Seeds * or small indoor plants
- Decorations or toys

DIRECTIONS:

1. Decide whether or not you want to make an "open" or a "closed" terrarium:
 - a. Open: Your terrarium is like a potted plant that you must water on a regular basis.
 - b. Closed: Your terrarium should require minimal watering (once every three weeks, or not at all).
2. Fill the bottom of your plastic container with small pebbles – about an inch high (this allows for proper drainage).
3. Fill the glass bowl with potting soil about 3/4 of the way up.
 - a. Option for Closed Terrarium: add a thin layer of activated charcoal granules to keep odors from developing
4. Plant some of the grass seed, or pick an assortment of small indoor plants and plant 1 to 3 in the container
5. If you are making a 'closed' container, make sure you can put the lid on otop of the plants. Add water to make the soil moist, but not soggy – some will just spray the water on from a water bottle so you don't overwater.
6. Open terrariums can be placed in a sunny indoor spot and should be watered when the soil becomes dry. Do not over-water or saturate the soil or the roots may rot.
7. Closed terrariums should be kept out of direct sunlight, as this will cause your terrarium to heat up and create fog inside.
8. Closed terrariums should be monitored daily for the first few days.
 - a. If the soil appears to be dry, add a bit more water.
 - b. If it appears too moist and the container becomes foggy, take the top off for a while and let it evaporate.
9. Artistic Consideration: Include decorative items, plastic toys or colourful rocks in your terrarium!



Closed terrariums aren't an exact science, and they can take a bit of trial and error to get right. Much like our own world's ecosystems, they can be susceptible to changes in light, temperature and overzealous species.



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