

Weather Watchers



This activity center is part of the **Water Science** theme.

What's the purpose of this activity?

This activity is a hands-on approach to describing the factors that determine the weather by using the **Weather Station** to see how we actually predict the weather.

The Weather Station uses a rain gauge, a barometer, a hygrometer, a thermometer, an anemometer, and a weather vane to predict the weather.

Ensure students understand the key terms **highlighted** in the activity by using them in several different contexts throughout the presentation.

Key Messages

The students should learn these messages from this activity:

- An understanding of weather and weather vocabulary
- How to predict weather patterns
- How weather affects precipitation rates

Materials

Permanent:

- weather station kit: anemometer, weather vane, rain gauge, weather board with barometer, hygrometer (humidity), thermometer
- White Board and markers

Supplies

- Washable markers.
- Paper towels.
- Bucket of water.
- Weather recording charts

What will I be doing?

You will show students how to use the various instruments on the weather station and allow them to make their own observations (you will be shown yourself on the morning that you volunteer). You will record the readings on a chart every 15 minutes to show change over the course of the day. You will then record the daily averages or trends on a weekly chart.

You will explain some basic weather forecasting principles to the students and, using the data and principles, ask them to predict the weather. After each group, erase the prediction only, and then ask the next group to try.

1. The Weather and climate

What is the difference between weather and climate? Weather is the conditions of the atmosphere at a certain period in time. Such features of weather include temperature and precipitation. Example: Today's weather is partly cloudy. Climate represents a long-term average of these various weather features (such as temperature and precipitation).

How does precipitation occur?

When warm air rises it is cooled by colder air. Then what happens? Clouds form! Water vapour condenses. What is condensation? Water in the form of a gas and is cooled forming a liquid. Then what happens? It rains or snows. This is precipitation. How do we know whether or not it will be rain or snow? It depends on the temperature in the atmosphere.

2. The Weather Station

MAKE SURE THE WEATHER STATION DOES NOT GET LEFT OUT OVERNIGHT!

How do we know what the weather will be like tomorrow? Meteorologists, or those that predict the weather, use special instruments and we have a few of them here today on our weather station.

(Pointing to the weather station), Does anyone know what a thermometer is? – It records temperature in Celsius. Ask someone to read the thermometer and record the results. Why do we measure temperature again? Please note: The thermometer should be placed in the shade and not the direct sunlight (if possible).

Does anyone know what an anemometer is? It measures wind speed. Have a child hold it. Our anemometer measures the strength and speed of wind.

Why do we use this device? It can help us predict how quickly the weather will change. Have a child record the measurement. Make sure you are in an open area.

Have a student hold the instrument with the spinning N, S, E, W. *What is this instrument called?* It's a Weather Vane. *Why do we use this device?* This indicates weather direction and the weather that we will get. Winds may also tell us if it will be warm or cold. For example cold winds come from the North and warm winds usually come from the South. Have the students record this accurately as it may be significant. Wind is recorded as the direction it is coming from (i.e. If the arrow of the vane is facing south it means that the wind is coming from the south).

Yet, wind alone is a poor weather predictor. Sudden changes in wind will signal a change in weather but it must be combined with a barometer and hygrometer for an accurate weather prediction. High winds may also indicate intense or strong systems or again, a coming change in weather. You can also throw grass or watch leaves fall to find out the direction of wind.

What instrument is used to record the amount of precipitation? A **Rain Gauge** (point to it) helps record the amount of precipitation. If we get rainfall, have the students record it on the chart. (Rain gauge should be placed in the ground CAREFULLY and not in area where someone will trip on it. Our gauge records in millimetres. Rainfall should be recorded whether it happens at day or night. When rainfall has ended, record the amount and empty the gauge before the next rainfall event.

Barometer - *What is a barometer?* This instrument measures air pressure. It has a dial face with a needle. The change in barometric pressure is more important than the individual readings but have the students take accurate readings and record them in *Kilopascals* on the chart.

1. **High Pressure** - *What happens if we have high pressure?* Air in a high pressure area warms as it descends because it is compressed. As air warms, it can hold more moisture so clouds don't form. Therefore, a high pressure area usually brings nice, dry, frosty or foggy weather. It is settled and calm weather. If the barometric pressure is rising, the weather should improve.
3. **Low Pressure** - Conversely, in a low pressure area, air rises, expands and cools. Cooler air holds less moisture and so water vapour condenses, forming clouds and often rain. Lows are often called storm systems. The approach of a "low" and the likelihood of rain can be predicted by a falling barometer reading. It will also be windy. Point this out to the students.

Besides the basic reading, the outer scale (measured in Pascals) will tell you if the pressure is rising or falling.

Hygrometer - This instrument measures humidity. Have students record the data. It can be used with the thermometer to predict rain. Warm air is able to hold more moisture than cold; hence the often sudden drop of temperature before it rains. So if the humidity is high, beware of rain when the temperature drops. Everyone in Ontario is familiar

with the influence of humidity on comfort relative to temperature.

Weather Forecasting

Using the data, have students make their best guess at a weather forecast. Enter what the children think the weather will be today and what they think it will be tomorrow. You can use pictures, words, or a combination (erase this after each group). On the temperature and pressure grids, keep a record for each group and record the weather for the day.

Forecasting is never an exact science, especially in Southern Ontario where the Great Lakes modify basic effects. If this was an exact science, TV weather forecasters would always be right!

Background Information:

Humidity (the amount of water in the air as vapour) is also a weather indicator. Higher humidity may reinforce a prediction of rain but must be accompanied by falling barometer, appropriate clouds, and wind.

Wind - In the northern hemisphere, mid latitudes (i.e. here) weather centres (Highs and Lows) generally move from West to East. Therefore, most of our weather systems come from the West, Northwest or Southwest.

Clouds – Clouds are also great weather indicators. Different sequences and types of clouds occur along a cold front than occur along a warm front. For example, a cold front is characterized by cumulus, cumulonimbus, cirrus, and altocumulus clouds. A warm front, however, forms nimbostratus, stratocumulus, stratus, altostratus, cirrostratus and cirrus clouds.

Cloud Chart – *How else can we predict the weather?* Clouds should be observed closely by students and recorded on the chart. Different clouds indicate whether a warm or cold front is approaching. Cloud type and amount are an excellent indicator of coming weather, but must be accurately classified and combined with wind and Barometer.

High and Low Pressure - This is the weight or density of the air on the earth's surface.

If there is time, ask children how the weather affects the way they do things. E.g., wear a heavy jacket when it's cold.

This activity works well with: "Water Cycle Madness"

Clean Up Procedures:

- ◆ Wipe down the weather board with a damp cloth
- ◆ Clean off all items that need cleaning
- ◆ Place all items carefully into the bin/box