

Weather Study Kit



HOME SCIENCE TOOLS
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Weather Study Kit Contents

This kit contains the following items:

- psychrometer with instructions
- mini weather station
- thermometer
- barometer
- Weather Golden Guide*
- hourly weather observation chart
- daily weather observation chart
- relative humidity chart

Introduction

The science of weather affects all of us every day! Will the game be rained out? Will we have a sunny day for a picnic? Will farmers have enough rain to grow good crops? In many ways, our lives depend on the weather. **Weather** is the condition of the atmosphere at any given point in time. We describe the atmosphere in terms of heat, moisture, wind and pressure.

The charts and instruments in this kit will help you take measurements and make observations of weather conditions. The data you collect will include temperature, wind speed and direction, humidity, barometric pressure, atmospheric conditions, precipitation, and wind chill. These weather terms will be described in more detail later on.

The weather observation charts in this kit can be photocopied, allowing you to collect daily observations for several months and hourly observations for several days. After you have collected enough data (several days' or months' worth), you can chart your measurements on graph paper or on the computer to see general trends and patterns of

weather. Using this information, you can predict or “forecast” the weather in your area.

Forecasting the weather is not an easy task! What we call “weather” is dependent on many different factors that are interrelated, including global air movements, ocean currents, and the tilt of the earth. The science of weather is called **meteorology**. Meteorologists use weather data to make predictions of future weather events. In this study, you get to make your own predictions using the scientific method.

The Scientific Method

Science is discovering and using knowledge about the universe and its governing laws. The **scientific method** is a tool used to acquire and apply this knowledge. You will use the scientific method over and over again in this study to gain knowledge about weather. The scientific method consists of four basic steps. (Sometimes these four steps are expanded to 7-8 more specific steps.)

- 1 **Observing and Gathering Data** - Read information and observe facts about weather and be able to describe and summarize what you have learned to your family and friends.
- 2 **Thinking About It/Predicting** - Use the information you have collected to make predictions (hypothesize) about future weather events and trends.
- 3 **Experimenting** - Conduct experiments to see if what you predicted is actually true. This step will mostly consist of collecting weather data on your weather observation charts.
- 4 **Forming Conclusions** - If the weather events turn out as you forecasted, then your predictions were probably based on sound principles of weather. If your predictions are off target, evaluate your data and start again with another hypothesis.

As you work through this study, the different steps of the scientific process will be identified. This will help you learn and remember them so that you can use this process in other areas of scientific study. As you progress, you will learn to develop more complex data collections and conclusions.

Temperature

Definition

Temperature is a measurement of the heat of the atmosphere. More specifically, temperature is a measurement of the average kinetic energy of the molecules that make up the air in our atmosphere. Air molecules move randomly and the faster this movement is, the “hotter” the air is.

We measure the *average* movement of these molecules and call this the temperature. Temperature change is the main factor that drives the weather changes and patterns of our planet.

Gathering Data

Temperature can be measured in degrees Fahrenheit (°F), which is a unit from the English measurement system and probably the temperature measurement you are most familiar with. Another unit used to measure temperature is degrees Celsius (°C), a metric unit. Water freezes at 32 °F and at 0°C; water boils at 212 °F and 100 °C. The metric system is based on a standard methodology, whereas the English system arose through convention or general use.

To convert from °F to °C, use this formula:

$$\frac{(\text{Temperature in } ^\circ\text{F} - 32) \times 5}{9} = \text{Temperature in } ^\circ\text{C}$$

To convert from °C to °F, use this formula:

$$\frac{(\text{Temperature in } ^\circ\text{C}) \times 9}{5} + 32 = \text{Temperature in } ^\circ\text{F}$$

You can either use the thermometer in the mini weather station or the separate thermometer to take daily and hourly measurements of the outside air temperature. To use the mini weather station thermometer, follow the instructions on the box to install the station and try to pick a location where the thermometer is not in direct sunlight, but protected from the wind. If the thermometer is in direct sunlight, the temperature readings will show sudden rises or falls—because of clouds covering the sun—which will not reflect the true outdoor temperature. If you use the separate thermometer, you can more easily keep it shielded from the sun while allowing the weather station full access to the wind. Both thermometers have markings in °F and in °C.

On the hourly weather observation chart, you can record the temperature for every hour of the day. A good experiment would be to take the temperature every hour for one day only (perhaps this could be a group effort, using an alarm clock), and then make hourly readings during your waking hours for many days after that. On the daily weather observation chart, you can record each day's high and low temperatures for a month. Use graph paper to graph the hourly temperature readings for a 24-hour period, the daily high and low temperatures for a month, and the monthly high and low temperatures for several months. Use different colors to indicate the highs and lows on your graphs.