

6. Monitoring Weather

Live from Weather Central

Driving Question

What is weather?

Materials and Equipment

For each student or group:

- | | |
|--|---|
| <input type="checkbox"/> Mobile data collection system | <input type="checkbox"/> Sensor extension cable |
| <input type="checkbox"/> Weather sensor | <input type="checkbox"/> Clipboard and pencil |

Safety

Follow all standard laboratory safety practices.

Thinking about the Question

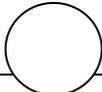
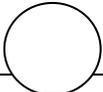
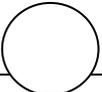
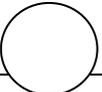
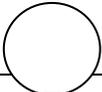
Discuss with your lab group members what weather means to you. Be prepared to share your thoughts with the class.

List changes that you have seen in weather over a 24-hour period and from one location to another.

How does weather impact us?

Sequencing Challenge

The steps below are part of the Procedure for this lab activity. They are not in the right order. Determine the proper order and write numbers in the circles that put the steps in the correct sequence.

				
Connect a sensor extension cable to the weather anemometer.	Make certain that each member of your lab group is aware of the safety rules and procedures for this activity.	Connect the weather anemometer to a data collection system that can remain outdoors.	Monitor live data without recording, making a note of weather data at three different times of the day.	Decide on a suitable outdoor location to set up a weather monitoring experiment.

Investigating the Question

Note: When you see the symbol "♦" with a superscripted number following a step, refer to the numbered Tech Tips listed in the Tech Tips appendix that corresponds to your PASCO data collection system. There you will find detailed technical instructions for performing that step. Your teacher will provide you with a copy of the instructions for these operations.

Part 1 – Making predictions

- Choose one location in your school environment and then complete Table 1 below, writing your predictions for the data and times listed:

Table 1: Predictions

	6 am	Noon	5 pm
Temperature			
Relative Humidity			
Wind Direction			
Wind Speed			
Dew Point			
Precipitation			
Barometric Pressure			
Cloud Cover			

2. Write your predictions for the following:
- a. When are maximum and minimum temperatures likely to occur during a 24-hour period?

- b. How will relative humidity change over a 24-hour period?

Part 2 – Measuring weather at specific points in time

3. Start a new experiment on the data collection system. ♦^(1.2)
4. Connect a weather anemometer sensor to the data collection system using a sensor extension cable. ♦^(2.1)
5. Display Temperature, Relative Humidity, Barometric Pressure, Dew Point, and Wind Speed in a digits display. ♦^{(7.3.1) (7.3.2)}

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6. Using the sensor and your observations, monitor the weather conditions at the same location and times that your predictions were made. ♦^(6.1) Complete Table 2 below.

Table 2: Weather conditions

	6 am	Noon	5 pm
Temperature			
Relative Humidity			
Wind Direction			
Wind Gust			
Dew Point			
Precipitation			
Barometric Pressure			
Cloud Cover			

7. What changes in the weather did you notice? Write your observations.

Part 3 – Measuring weather over a time period

8. Display Temperature, Relative Humidity, Dew Point and Air Pressure on the y-axis of a graph with Time on the x-axis. ♦^(7.1.10)
- Note:** If you are using the SPARK Science Learning System, you will need to display the graphs on multiple pages.
9. Change the periodic sampling rate to take a measurement every 30 seconds. ♦^(5.1)
10. Choose a location in the school yard to collect weather data and then start data recording. ♦^(6.2)

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11. After 60 minutes, stop data recording. ♦^(6.2)
12. Save your experiment according to your teacher's instructions. ♦^(11.1)
13. Based on your graph, describe the relationship between
- a. Temperature and relative humidity
-
- b. Temperature and dew point
-
- c. Barometric pressure and temperature
-

Part 4 – Temperature

14. Start a new experiment on the data collection system. ♦^(1.2)
15. Connect a weather sensor to the data collection system. ♦^(2.1)
16. Display Temperature on the y-axis of a graph with Time on the x-axis. ♦^(7.1.1)
17. Set up your mobile data collection system in the same location you used for Part 3 and start data recording. ♦^(6.2) Record data for 24 hours.
18. After 24 hours, stop data recording. ♦^(6.2)
19. Save your experiment according to your teacher's instructions. ♦^(11.1)

Part 5 – Relative humidity

20. Start a new experiment on the data collection system. ♦^(1.2)
21. Connect a weather sensor to the data collection system. ♦^(2.1)
22. Display Relative Humidity on the y-axis of a graph with Time on the x-axis. ♦^(7.1.1)
23. Set up your mobile data collection system in the same location you used for Part 3 and start data recording. ♦^(6.2) Record data for 24 hours.

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24. After 24 hours, stop data recording. ♦^(6.2)
25. Save your experiment according to your teacher's instructions. ♦^(11.1)

Answering the Question

Analysis

1. How did your predictions from Part 1 compare to the results from Parts 2 to 5?

2. What factors determine whether or not a location receives precipitation?

3. How does monitoring weather data over a period of time help you become more familiar with the weather you experience in your area?

4. Which aspect of this investigation did you find most surprising or different from your predictions? Be prepared to share your thoughts with the rest of the class.

Multiple Choice

Circle the best answer or completion to each of the questions or incomplete statements below.

1. The amount of water vapor in the air refers to:
 - A. Rain
 - B. Snow
 - C. Sleet
 - D. Humidity

2. Lines connecting areas of equal atmospheric pressure are known as:
 - A. Isotherms
 - B. Isobars
 - C. Fronts
 - D. Isohyets

3. The scale used to measure wind speeds by visible signs is known as the _____ scale.
 - A. Beaufort
 - B. Richter
 - C. Palmer
 - D. Bergeron

4. A tornado watch is issued:
 - A. During every thunderstorm
 - B. When a tornado has been spotted
 - C. When conditions are favorable for the formation of tornados
 - D. Only in the spring

5. Which of the following is not a way of producing clouds?
 - A. Lifting air over a mountain
 - B. Lifting air along a weather front
 - C. Warming the surface of the earth
 - D. Subsidence

6. Why do hurricanes not occur all year long?
 - A. Winds are not strong enough in the winter
 - B. In the winter, there is not sufficient shear in the atmosphere
 - C. Convection does not occur in the winter
 - D. The water temperatures are not warm enough to foster the growth of the storms

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Key Term Challenge

Fill in the blanks from the randomly ordered words below:

barometer	temperature	relative humidity	weather
climate	precipitation	water vapor	clouds

1. Changes in the condition of the atmosphere on a daily basis or even on an hourly basis are referred to as _____.
2. The part of the water cycle that produces rain, hail, or snow is _____.
3. Up until about fifty years ago, the _____ was the instrument primarily used for measuring atmospheric pressure.
4. The _____ describes the long-term weather trends of a region and is based on data measured over a period of at least thirty years.
5. The amount of _____ in the air compared to the amount the air is able to hold at a given temperature is known as _____ and is usually expressed as a percent.
6. Just before dawn is the time of day when the lowest _____ is often recorded.
7. The formation of _____ is dependent upon there being enough moisture in the air and a temperature which allows that moisture to condense into liquid form.