

Topic: Hurricane Prediction
Lesson Title: Hurricane Prediction Lab
Wind Speed vs. Barometric Pressure
Grade Level: 6th-8th Grade
Science Domain: Earth Science

Connecting to the Next Generation Science Standards

ESS2.D: WEATHER AND CLIMATE – Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through the ocean currents.

The materials/lessons/activities outlined below are intended to help students reach the Performance Expectations listed below.

Performance Expectations:

Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Connections to Classroom Activity

Students: Students will make a line graph as a mathematical model to describe the relationship between wind speed and barometric pressure to better understand the formation of hurricanes.

Science and Engineering Practices

- Developing and using models
- Using mathematics and computational thinking
- Analyzing and interpreting data

- Students will use the National Hurricane Center website to collect and graph data about an historic hurricane.
- Students will use the graph as a model to determine if there is a relationship between wind speed and barometric pressure in a hurricane.

Disciplinary Core Idea

ESS2: Earth's Systems
PS3: Energy

- Students will use the National Hurricane Center website to collect data to determine how the atmospheric and oceanic conditions cause uneven heating and cause hurricanes to form.

Teacher Background Information

The National Hurricane Center archives data about hurricanes. This data can be used to teach students how data is collected and analyzed in order to predict weather conditions. Barometric pressure is an important piece of data to scientists who are predicting and monitoring hurricane conditions. Barometric pressure may be given in "inches of mercury," or in "millibars." A hurricane is a low pressure system, so watching the change in barometric pressure is beneficial in keeping those living in hurricane prone areas safe. The data most analyzed when predicting hurricane movement is winds and barometric pressure. There is a negative correlation of wind speed and barometric pressure so the atmospheric conditions in and around a hurricane are important for prediction and warnings. As seen in the Environmental Monitoring and Hurricane Prediction exhibits at the Infinity Science Center, the collection of data is very important when monitoring changing conditions around a hurricane. This lesson will allow students a chance to read actual data from a hurricane, graph the data, and analyze the relationship of the data to better understand the science involved in the formation and strengthening of a hurricane.

Statement of Learning Objective: ABCs – Audience, Behavior, Condition

Students will use the National Hurricane Center website to collect data about an historic hurricane. They will analyze the data to determine the relationship in wind speed, barometric pressure and the change in the strength of a hurricane.

Materials: (per group)

- access to the internet
- graph paper
- pencils
- rulers
- barometer (1) for whole class discussion or the barometer picture attached

Vocabulary:

hurricane, barometric pressure, latitude, longitude, Saffir-Simpson scale
Safety:
<p>Adaptations/Accommodations for Exceptional Students: Some students may need extra support to set up the graph with the proper intervals, etc. One suggestion is to give the student a partially completed data chart instead of having the student to gather all of the data. Students could also be given a graph that was partially completed or with the increments already set for them.</p>
<p>Literacy Connections:</p> <ul style="list-style-type: none"> • Isaac's Storm: A Man, a Time, and the Deadliest Hurricane in History by Erik Larson • Hurricanes by Paul Kupperberg • Hurricane Katrina: Devastation on the Gulf Coast by Debra Miller • Hurricane Force: Tracking America's Killer Storms by Joseph B. Treaster • Storm Surge: The Science of Hurricanes by Don Nardo

5E Instructional Process:

<p><u>Engage:</u> Activity: What do you know about air pressure?</p> <ul style="list-style-type: none"> • Show the barometer (or picture of barometer) under a document camera and ask students to discuss with their lab groups what information is on the barometer and what they think it is measuring. • Using the following guiding questions, facilitate a class discussion about barometric pressure and how it is measured. <p>Guiding Questions for the class discussion:</p> <ol style="list-style-type: none"> 1. What is the scale that is used on this barometer? 2. What is the unit of measurement for the barometer? 3. What does air pressure mean? 4. What things would affect air pressure? 5. What does a "Low" or "High" mean when talking about weather?
<p><u>Explore:</u></p> <ul style="list-style-type: none"> • Begin by asking students how they think that barometric pressure is affected in a hurricane. • Ask them to predict what they think happens to the barometric pressure when the hurricane increases in strength. • Ask students to predict what happens to the wind speed when a hurricane increases in strength. • Next, show students how to use the National Hurricane Center (NHC) website to collect data about hurricanes of the past.

- Use the “NHC website sheets 1, 2, 3, and 4 to describe how to use this website and how to collect data.
- Then, give students a Data Chart for wind speed vs barometric pressure.
- Use the Sample Data Chart to show student where to record the data that they get from the National Hurricane Center website.
- Students should collect data from 10-12 advisories for the hurricane.

Explain:

Students will now graph their data to see if there is a correlation between wind speed and barometric pressure.

1. Review the rules about graphing.
2. Ask students to title the graph, “Wind Speed vs Barometric Pressure in a Hurricane.”
3. Wind speed will be on the “y” axis and barometric pressure in millibars (MB) will be on the “x” axis.
4. After the graphs are completed, ask students if there is a correlation between wind speed and barometric pressure. Ask them to support their ideas with their graphs.

Elaborate:**Activity – Writing**

- Have students defend their answer to the following question by making a claim and providing evidence to support their claim from their data charts and graphs.
- Question: What happens to the strength of a hurricane as the barometric pressure decreases?

Evaluate:

1. Students should see from their graphs that there is a negative correlation between wind speed and barometric pressure. As wind speed increases, barometric pressure decreases.