

LESSON PLAN SUBMITTED FOR MARINE SCIENCE WORKSHOP
BY SETH KASTENBAUM, MARINA DEL REY M.S.
DATE: 8/31/08
TO: LETICIA ESCAJEDA, HENRY ORTIZ

INTRODUCTION/ENGAGEMENT:

With Hurricane Gustav hitting the Gulf Coast it's important to understand how nature's fury can disrupt our lives. Imagine children about to begin school in classrooms all along the Gulf Coast (like yourselves). Suddenly, you're told by your parents that because of the approaching storm, the family must evacuate. What is a hurricane? How is it formed? What makes it dangerous to your low lying area along the Mississippi River Delta? This marine science/weather topic is ripe for students to study NOW. With online access and a projector with screen, we would also look at current Gustav news.

TITLE OF LESSON PLAN:

Hurricane!

LENGTH OF LESSON:

Two class periods

GRADE LEVEL:

6-8

SUBJECT AREA:

Marine Science/Weather

OBJECTIVES:

Students will understand the following:

1. Wind speed increases the height of ocean waves.
2. Higher waves occur in shallower water.

MATERIALS:

Provide the following materials for each group:

9" × 13" baking dish
Flexible straw
Duct tape
Water
Ruler

PROCEDURE:

1. Review with your students what they have learned about the causes and characteristics of hurricanes. Tell them they are going to do an experiment to discover the effects of wind speed and water depth on the height of waves in a hurricane.
2. Divide your class into pairs or small groups. Demonstrate how to set up the experiment as follows:
- 3.

- Place the baking dish on a desktop.
- Bend the straw so that it forms an L shape.
- Place the straw inside the baking dish in the middle of one of the 9-inch sides, so that the shorter end faces straight up, touching the side of the dish, and the longer end is suspended about half an inch over the bottom of the dish. One open end of the straw will stick straight up, and the other will face the opposite 9-inch side of the dish.
- Tape the straw to the inside of the dish to hold it in place.
- Pour water into the dish until it reaches just below the straw.

4. One partner or group member should blow very gently into the end of the straw that is sticking straight up, creating “wind” over the water in the dish.

5. Another student should observe the water at the opposite end of the straw and mark the wave height on the outside of the dish.

6. Have students measure and record the wave heights, beginning their measurements from the desktop.

7. Students should repeat the procedure two more times, blowing harder each time, and record their measurements to assess the effect of wind speed on the height of waves.

8. Have students remove the water from the dish, move the straw up near the top of the dish, and refill the dish with water until it reaches just under the straw. Then they can repeat the procedure to compare wave height in deeper and shallower water.

9. Have each student write a report describing the experiment in detail, reporting the results, and stating the conclusions he or she drew from the results.

ADAPTATIONS:

Adaptations for Older Students:

Have students do research to find scientific explanation for the effects of wind speed and water depth on the height of ocean waves.

DISCUSSION QUESTIONS:

1. Describe the mechanics of the development of a hurricane.

2. Storm surge water height over open water is not as high as when it reaches land. Assuming the pressure in the eye of the hurricane is the same for both instances, why is this so?

3. Many years ago, there were no laws that forced people to evacuate before a hurricane struck. Now there are mandatory evacuation laws in place. Is this good? Why?

4. Study a cross section of a hurricane and write a journal entry describing what you would see if you actually flew through one. Be sure to include details about any changes you observe within the hurricane itself.

5. Would you like to be a Hurricane Hunter and fly through a hurricane? Why or why not?

EVALUATION:

You can evaluate your students on their reports using the following three-point rubric:

- **Three points:** complete description of all steps of experiment; accurate, detailed reporting of results; clear statement of conclusions
- **Two points:** description of experiment somewhat disorganized or hard to follow; adequate reporting of results; statement of conclusions included
- **One point:** vague or inaccurate description of experiment; adequate reporting of results; statement of conclusions lacking

You can ask your students to contribute to the assessment rubric by determining what information should be included in the description, results, and statement of conclusions.

EXTENSION:

Historical Hurricanes

Have students do research to find information about particularly devastating hurricanes in history. They should write descriptions of their hurricanes, giving dates and locations and describing the damage caused by the storms.

Dire Predictions

Have students contact the National Weather Service's Hurricane Warning Service in Miami, Florida, or do research on the Internet (or both) to find out how hurricanes are predicted and how their paths are tracked.

One of the busiest hurricane seasons in decades was that of 1995. This feature article reviews the intense hurricane activity of that season.

WEB LINKS:

HURRICANE!

EBS HURRICANE! links page.

<http://mcps.k12.md.us/departments/eventscience/ebs.Hurricane.html>

Atlantic Hurricane Tracking Data by Year

Archived hurricane tracking data from 1886 to present. Also archived data for Pacific hurricanes from the last few years.

<http://weather.unisys.com/hurricane/atlantic/index.html>

Images of Hurricanes and Other Storms

Stills and movies of hurricanes and other storms.

<http://www.ncdc.noaa.gov/ol/satellite/olimages.html>

VOCABULARY:

tropical depression

A region of low barometric pressure.

Context:

If the water temperature is 80 degrees F or more the storm becomes a tropical depression.

eye

An area like a hole in the center of a tropical cyclone marked by only light winds or complete calm with no precipitation.

Context:

A column of clear air develops. This is the eye of the storm.

GOES

An acronym for Geostationary Operational Environmental Satellites.

Context:

The newest weapons for monitoring storms are the new Geostationary Operational Environmental Satellites. GOES Satellites.

storm surge

Domes of water produced by the action of cyclonic winds during a hurricane, in which the sea level can be up to five meters higher than normal.

Context:

In places where the shoreline is shallow the storm surge can reach 30 feet high.

typhoon

A tropical cyclone occurring in the region of the Philippines or the China sea.

Context:

In the western Pacific typhoons are often more powerful because they have more warm sea to travel over to build up their power to full strength.

ACADEMIC STANDARDS:**Grade Level:**

6-8

Subject Area:

science

Standard:

Understands basic features of the Earth.

Benchmarks:

Knows that when liquid water disappears, it turns into gas (vapor) in the air and can reappear as a liquid when cooled.

Grade Level:

6-8

Subject Area:

science

Standard:

Understands basic features of the Earth.

Benchmarks:

Knows that clouds, which are formed by the condensation of water vapor, affect weather and climate; some do so by reflecting much of the sunlight that reaches Earth from the Sun; others hold heat energy emitted from the Earth's surface.

Grade Level:

6-8

Subject Area:

science

Standard:

Understands basic features of the Earth.

Benchmarks:

Knows that the cycling of water in and out of the atmosphere plays an important role in determining climatic patterns: water evaporates from the surface of the Earth, rises and cools, condenses into rain or snow and falls to the surface where it forms rivers and lakes and collects in porous layers of rock.

Grade Level:

6-8

Subject Area:

science

Standard:

Understands basic features of the Earth.

Benchmarks:

Knows the composition and structure of the Earth's atmosphere.

Grade Level:

6-8

Subject Area:

science

Standard:

Understands the interactions of science, technology and society.

Benchmarks:

Knows that technology is essential to science because it enables observations of phenomena that are far beyond the capabilities of scientists due to factors such as distance, location, size and speed.

Grade Level:

6-8

Subject Area:

science

Standard:

Understands the interactions of science, technology and society.

Benchmarks:

Knows that technological designs have constraints; some constraints are unavoidable (e.g., properties of materials, gravity, effects of weather and friction), and other

constraints limit choices in the design (e.g., environmental protection, human safety, aesthetics).

Grade Level:

6-8

Subject Area:

geography

Standard:

Knows the physical processes that shape patterns on Earth's surface.

Benchmarks:

Knows the physical components of Earth's atmosphere (e.g., weather and climate), lithosphere (e.g., landforms such as mountains, hills, plateaus, plains), hydrosphere (e.g., oceans, lakes, rivers) and biosphere (e.g., vegetation and biomes).

Grade Level:

6-8

Subject Area:

geography

Standard:

Knows the physical processes that shape patterns on Earth's surface.

Benchmarks:

Knows the consequences of a specific physical process operating on Earth's surface (e.g., effects of an extreme weather phenomenon such as a hurricane's impact on a coastal ecosystem; effects of heavy rainfall on hill slopes; effects of the continued movement of Earth's tectonic plates).

Grade Level:

9-12

Subject Area:

Earth science

Standard:

Understands basic features of the Earth.

Benchmarks:

Knows the major external and internal sources of energy on Earth (e.g., the Sun is the major external source of energy; the decay of radioactive isotopes and gravitational energy from the Earth's original formation are primary sources of internal energy).

Grade Level:

9-12

Subject Area:

Earth science

Standard:

Understands basic features of the Earth.

Benchmarks:

Knows that weather and climate involve the transfer of energy in and out of the atmosphere.

Grade Level:

9-12

Subject Area:

Earth science

Standard:

Understands basic features of the Earth.

Benchmarks:

Knows how winds and ocean currents are produced on the Earth's surface (e.g., effects of unequal heating of the Earth's land masses, oceans, and air by the Sun; effects of gravitational forces acting on layers of different temperatures and densities in the oceans and air; effects of the rotation of the Earth).

DiscoverySchool.com
<http://www.discoveryschool.com>

Copyright 2001 Discovery.com.

Teachers may reproduce copies of these materials for classroom use only.