

Topic:	Post Visit Lesson Plan for Hurricane Prediction Lab
Lesson Title:	Take a Spin with a Hurricane!
Grade Level:	4th – 5th Grades
Science Domain:	Earth's Systems
Purpose:	Students will use the information learned at the Hurricane Prediction Lab at the INFINITY Science Center to build a model of a hurricane and learn how to be prepared in the event of a hurricane.

Connecting to the Next Generation Science Standards

Students who demonstrate understanding can:	
Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 5-ESS2-1: Earth's Systems	
The materials/lessons/activities outlined below are intended to help students reach the Performance Expectations listed below.	
Performance Expectations:	Connections to Classroom Activity Students:
<i>Science and Engineering Practices</i>	
Developing and Using Models Modeling in 3-5 builds on K-2 experiences and progresses in building and revising simple models and using models to represent events and design solutions. <ul style="list-style-type: none"> Develop a model using an example to describe a scientific principle. 	I can collect data about past hurricanes and use this information to build or revise a model or design.
<i>Disciplinary Core Idea</i>	
ESS2.A: Earth Materials and Systems <ul style="list-style-type: none"> Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including 	I can describe the conditions in which hurricanes form when more than one Earth system interacts and how that affects the Earth's surface materials.

<p>humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.</p>	
<p><i>Crosscutting Concept</i></p>	
<p>Systems and System Models</p> <ul style="list-style-type: none"> • A system can be described in terms of its components and their interactions. 	<p>I can describe the parts of a hurricane system.</p>

Teacher Background Information

After you return from your field trip at the INFINITY Science Center, review the following information to discuss as needed with your students.

The Hurricane Prediction Lab at the INFINITY Science Center in Pearlinton, Mississippi, is designed as a team activity, in which visitors learn the importance of different variables for accurately predicting a storm's path and its risk. Within the exhibit, there are four touch-screen stations. Students will learn about four different variables of hurricane prediction:

1. Wind speed and direction
2. Barometric pressure
3. Air temperature, and
4. Water temperature

There are three main parts to a hurricane structure: the rainbands, the eye, and the eyewall. Air spirals counterclockwise in the northern hemisphere and clockwise in the southern hemisphere. In the center or the "eye", the air sinks forming a mostly cloud free area.

The National Weather Service along with the National Oceanic and Atmospheric Administration has visual images and animations of hurricanes to show students as needed.

http://www.srh.noaa.gov/jetstream/tropics/tc_structure.html

Visitors at the INFINITY Science Center will see a 2D map of the Gulf and Caribbean region extending into the mid-Atlantic Ocean. A typical storm path is shown, along with current readings for the four variables. Narration by an actual NOAA or National Weather Service scientist introduces the students to the activity and invites them to learn about the influence of these variables on the storm's path. For example, students will see how changing barometric pressure, can change a storm's landfall from eastern Florida to southern Louisiana. Working in teams of four, students will work together to predict the path of a storm that is forming out in the Atlantic. Data from Hurricane Katrina is used to predict this storm. While at the exhibit, students will learn that scientists use similar training to predict an actual storm's path and the important role of data collection for accurate weather predictions. Artifacts from Hurricane Katrina will also be incorporated into the exhibit.

Additional teacher background about tracking hurricanes from NOAA:

http://oceanservice.noaa.gov/education/for_fun/FollowthatHurricane.pdf

Hurricane Classification

http://www.srh.noaa.gov/jetstream/tropics/tc_classification.html

Statement of Learning Objective:

Students will learn how to build a model of a hurricane and label the parts within the system.

Common Learner Misconceptions:

Students may think that all hurricanes spin in the same direction regardless of location. Hurricanes in the Northern Hemisphere spin in a counterclockwise motion and in the Southern Hemisphere in a clockwise motion. The Coriolis Effect is caused by the Earth's rotation which deflects air moving between two places. Thus it causes an object to move to the left in the Southern Hemisphere and to the right in the Northern Hemisphere.

Materials:

- Charts from previous lesson about hurricanes
- Digital photos from class field trip at the Hurricane Prediction Lab

Vocabulary:

- Hurricane preparedness
- Interviewer
- Interviewee
- Meteorologist

Safety:

General classroom safety rules apply to this lesson. When students are creating their model hurricane, they should use materials with parent permission. Also, prior permission from parents or guardian must be obtained in writing before a student interviews anyone about a hurricane or storm experience.

Adaptations/Accommodations for Exceptional Students:

ELL students may need help with understanding the vocabulary and/or writing assignments. Pair students with a partner to help with directions and label the materials with the English word and also the student's native language when learning new material. Considering pairing students who may need additional help while researching the information in the computer lab or in the classroom.

Literacy Connections:

Benoit, P. (2012) *Hurricane Katrina*. New York: Children's. Print.

Cole, J. & Degen, B. (1996) *The magic school bus inside a hurricane*. New York, NY: Scholastic. Print.

Gibbons, G. (2010) *Hurricanes!* New York: Holiday House. Print.

Larson, K. Nethery, M. & Cassels, J. (2008) *Two Bobbies: A true story of hurricane Katrina, friendship, and survival*. USA: Bloomsbury. Print.

Simon, S. (2007) *Hurricanes*. New York, NY: Harper Collins. Print.

Tarshis, L. & Dawson, S. (2005) *I survived hurricane Katrina*. New York: NY: Scholastic. Print.

5E Instructional Process:

Engage:

Activity

1. Gather the students together and ask them what they learned as a result of the field trip to The INFINITY Science Center. In particular, you want to know what they learned as a result of the Hurricane Prediction Lab.
2. Refer to the class chart from the previous lesson on "Recipe for a Hurricane". Is there any information that we need to change as a result of the information learned at the exhibit?
3. Listen as student's share any new information learned at the exhibit. Refer back to digital photos taken with students at the exhibit if they are available.

Guiding Questions

1. What did you learn at the Hurricane Prediction Lab at the INFINITY Science Center?
2. Is there any information that we need to change as a result of the information learned at the exhibit?

Explore:

Activity:

1. As a review of how a hurricane forms, begin this part of the lesson with the video link with Meteorologist Mike Bettes from the Weather Channel as he explains the "Anatomy of a Hurricane." <https://weather.com/storms/hurricane/video/anatomy-of-a-hurricane>
2. How does this video compare and contrast to what we learned at the Hurricane Prediction Lab at the INFINITY Science Center? What Earth Systems interact when a hurricane forms? How is the biosphere and geosphere impacted as a result of a hurricane? What happens when a hurricane makes landfall? Create a Hurricane Impact chart with each of the spheres (Atmosphere, Hydrosphere, Geosphere and Biosphere) of the Earth and list possible interactions and how each sphere is impacted as a result of a hurricane.
3. Duplicate the Hurricane Data Collection chart and give to each student. Each student should research the hurricanes listed to collect data on the following categories: Hurricane Name, Category, Dates Active, Wind Speed, Pressure, Areas Affected, Damage in US Dollars and Number of Deaths. Information can be found at the following website: https://en.wikipedia.org/wiki/List_of_deadliest_Atlantic_hurricanes
4. The ultimate goal for collecting data about past hurricanes is to use this information to build or revise a model or design of one of the hurricanes researched. Challenge students to build a model hurricane out of various household supplies. Students should also label the parts of the hurricane and demonstrate knowledge to show how hurricanes in the northern hemisphere move in a counterclockwise motion due to the Coriolis Effect. Short video from Nova explains how storms spin due to force. <https://www.youtube.com/watch?v=i2mec3vgeal>

Guiding Questions:

1. How does this video compare and contrast to what we learned at the Hurricane Prediction Lab at the INFINITY Science Center?
2. What Earth systems interact when a hurricane forms? How is the biosphere and geosphere impacted as a result of a hurricane? What happens when a hurricane makes landfall?

Explain:

Activity

1. How do people prepare for a hurricane? What kinds of items do you need to have at home in order to be prepared for a hurricane? Students who live near a coastal area are well aware of how hurricanes can damage or destroy homes and property. Being prepared for a hurricane can help alleviate anxiety. Feeling anxious about storms is natural and learning how to take precautions can help some students manage their anxiety.

2. Hurricane Preparedness Week is usually the second or third week in May. The National Oceanic and Atmospheric Administration (NOAA) lists several useful connections about planning and safety on its website:
http://www.nws.noaa.gov/com/weatherreadynation/hurricane_preparedness.html
3. If you live in a coastal community, check with your local government for resources or make this link available for students if you live in Mississippi:
<http://www.msema.org/wp-content/uploads/2016/05/Hurricane-Preparedness-2016.pdf>
If you live in Louisiana, then you may find this link helpful:
http://www.lsp.org/pdf/Emergency_Guide_v46b_7-1_4p.pdf
4. Choose one of the books listed under Literacy Connections, or one that your Media Specialist recommends about hurricanes and read aloud to your class as time allows.

Guiding Questions

1. How do people prepare for a hurricane? What kinds of items do you need to have at home in order to be prepared for a hurricane?

Elaborate:

Activity

1. Ask your students if they know anyone who has experienced a hurricane. With parent or guardian permission, ask students to interview the person to share their experience and then share with the class. Students should prepare a class set of at least 10 questions to ask his/her interviewee.
2. If students do not know anyone who has experienced a hurricane, then ask them to interview someone who has experienced a severe storm and to include at least ten questions for his/her person to answer. Regardless, students will have the experience of talking with others and recording the answers just like a reporter and then sharing that information with the class.
3. If time allows, then have students pretend to be meteorologists and describe safety tips, hurricane preparedness, and/or describe how a storm develops into a hurricane. Students will need to prepare visual aids or a Power Point or Prezi to use during his/her presentation.

Guiding Questions

1. Who do you know that has experienced a hurricane? What did they do to prepare for the hurricane?

Evaluate:

Activity

1. Ask students to complete the following sentence starters about hurricanes. Challenge the students to think of at least 5 new facts they have learned about hurricanes and explain.
I used to think hurricanes _____, but now I know...
2. This assessment technique is useful in assessing what students thought they knew about hurricanes at the beginning of the unit of study and comparing what know they know as a result of the lessons and field trip to the INFINITY Science Center.
3. If time allows, have students create a Wordle about hurricanes. Wordles can demonstrate student understanding about a topic by creating "word clouds".
<http://www.wordle.net/>