Hurricane Student Activity Book

I. Introduction

Did you know that hurricanes are the largest, most destructive storms on Earth? Hurricanes can produce tornadoes, large hail, severe flooding and erosion as well as strong winds.

We know how bad the hurricane is and we can predict where it will go with reasonable accuracy. This is possible because of satellite technology and both Air Force and NOAA Hurricane Hunter aircraft flying directly into the storms themselves. Hurricane Hunters and the staff of the National Hurricane Center have saved thousands of lives. People living in areas likely to be hit by a hurricane have time to prepare for these huge powerful storms long before they strike.

Get Info Objectives

1. Describe when and where hurricanes form.
2. Describe what is necessary for hurricanes to strengthen.
3. Describe what parts of the hurricane are most damaging.

Gather Data Objectives

1. Graph information on wind speed, atmospheric pressure, and storm tide.
2. Convert miles per hour to knots. (Knots are like miles per hour for boats.)
3. Trace the path of the worst hurricane in the year you were born.

Application Objectives

1. Use the graphs you make to find the approximate wind speed and storm tide of other hurricanes.
2. Determine the effect of storm tide on coastal areas.
3. Hypothesize what would happen if a major hurricane occurred where you live.

Before doing anything else, add the NOAA Research "Hurricanes" page to Bookmarks or Favorites on your browser.

- From the Hurricanes main page, click "Get Info."

II. Get Info

A. What is a Hurricane?

- Click on the "Hurricane Definition" site.
- Click on "Defining a Hurricane".
- Read the information and answer the following questions.

1. What is a hurricane?

- Click "Back" to return to the "Hurricane Definition" site.
- Scroll down to the "Saffir-Simpson Hurricane Scale."

B. Intensity

The Saffir-Simpson Scale is used to classify hurricanes based on sustained (long-lasting) wind speed. Hurricanes are classified in this way because it is the most accurate method of describing a storm that affects such a large area.

1. Fill in the chart with the Saffir-Simpson Scale of hurricane intensities.

Category	Winds MPH	Damage	Examples
1			
2			
3			
4			
5			

- Click back to return to the "Hurricane Definition" site.
- Scroll down and click on "Storm Structure."

C. Storm Structure

1. What three things must occur for a hurricane to get stronger?

   a. _____

   _____

   b. _____

   _____

c. _____

_____

- Click "Back" to return to the "Get Info.1" web page
- Click "Forward" at the bottom of the page.

D. Hurricane Season

- Return to the "Hurricane Definition" site.
- Scroll down to and click on "Breeding Grounds."

1. In what time of year do most hurricanes form?

_____

_____

2. Where do hurricanes form?

_____

_____

- Click "Back" to return to the "Hurricane Definition" site.
- Scroll down to and click on "Storm Fury."

E. Storm Surge

1. Explain what storm surge is and how it occurs.

_____

_____

_____

_____

- Click "Back" to return to the "Hurricane Definition" site.
- Scroll down to and click on "Storm surge, floods and winds."

2. Describe the effects of storm surge on coastal areas during a hurricane.

_____

_____

_____

- Click "Back" to return to the "Get Info.2" web page.
- Click on the NOAA "Hurricane Basics" PDF file.
- Go to the section on "Structure" beginning on Page 8 to learn about the different features of hurricanes. Read the section "Hurricane Size."

F. Size of Hurricanes

1. Describe a hurricane in terms of land area covered and forward speed.

_____

_____

_____

- Go back to Page 7 and read the section "Storm's End."

2. Why does a hurricane die out?

_____

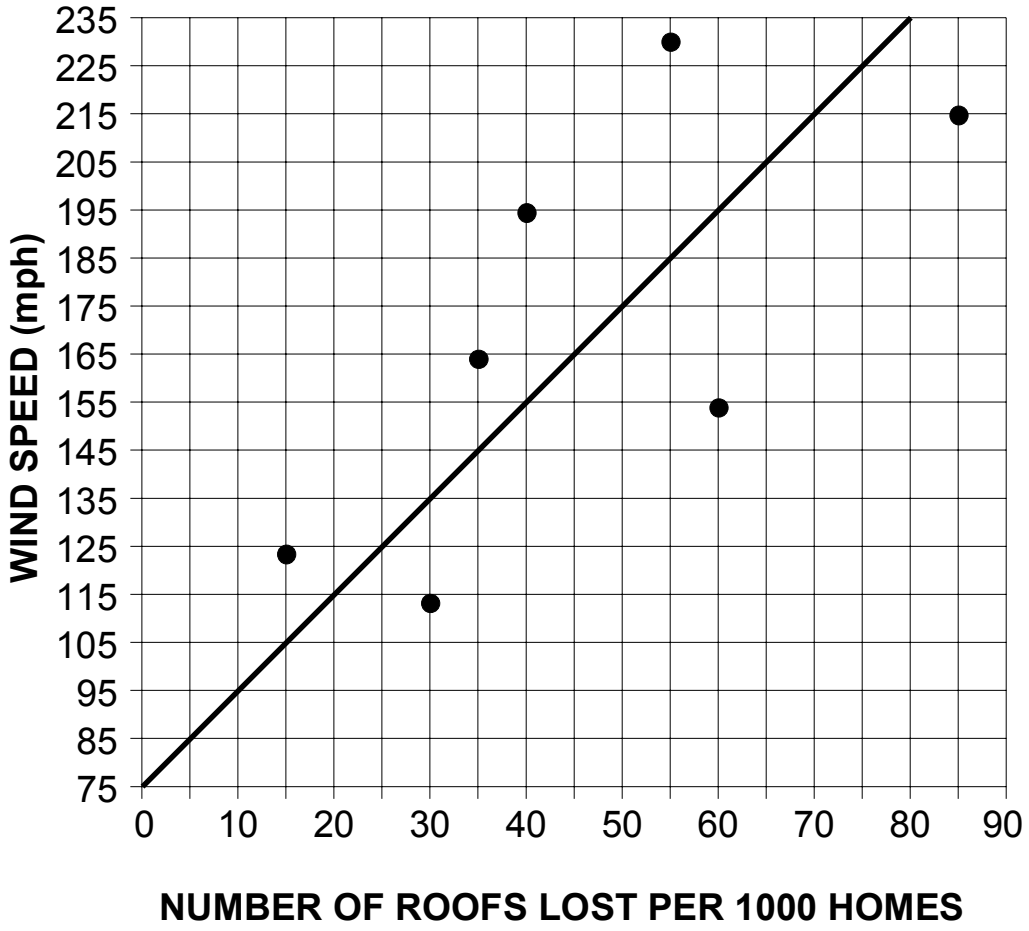
_____

_____

- Click "Back" to return to the NOAA Research "Hurricanes" main page, or choose "Hurricanes" from Bookmarks or Favorites.
- Click "Gather Data."

III. Gather Data

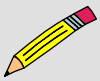
None of the sets of points that you will place on the graphs on the next few pages will form perfect lines. You will have to determine where the line should be to best fit the data points.
Example: Below is a sample data set (a collection of information) to show you the best-fit line idea. Notice on the graph below that there is a perfectly straight line that comes as close as possible to all the data points but doesn't actually touch any data points.



A. Graph Storm Tide vs. Pressure

- Click on the "Tropical Cyclone Reports" site.
- Select "Atlantic" for the basin.
- Select "2003" for the year.
- Select "Claudette."
- Follow the "Hurricane Claudette (Atlantic)" link to see the report in a new browser window.

- Scroll to the bottom of Table 1 to find the pressure at landfall at Matagorda Island, TX.
- In Table 3, in the Storm Tide column, find the highest recorded storm tide.

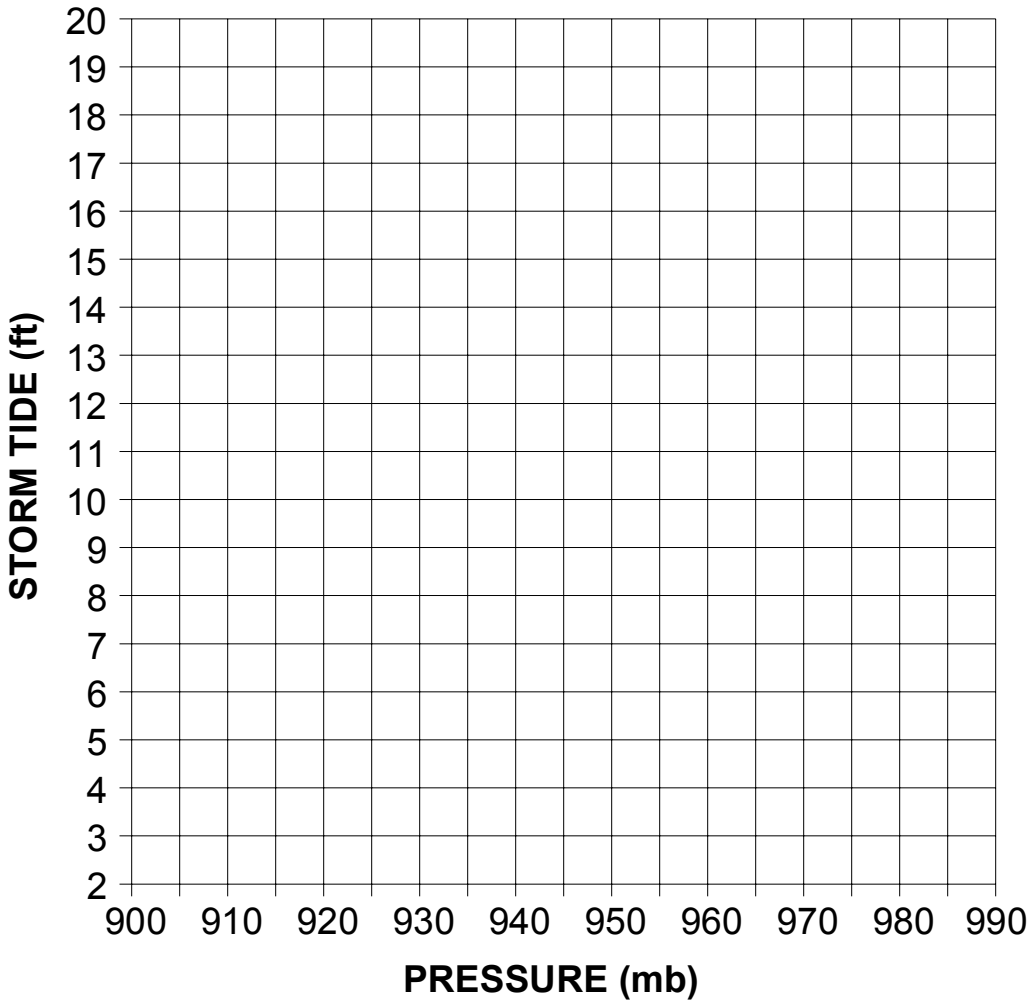


- Mark the place on the following graph where the two numbers meet.

Find and record the same information (pressure at landfall and highest storm tide height) for the following Atlantic hurricanes:

Juan (2003)
Isabel (2003)
Michelle (2001)
Floyd (2001)
Bonnie (1998)
Andrew (1992).

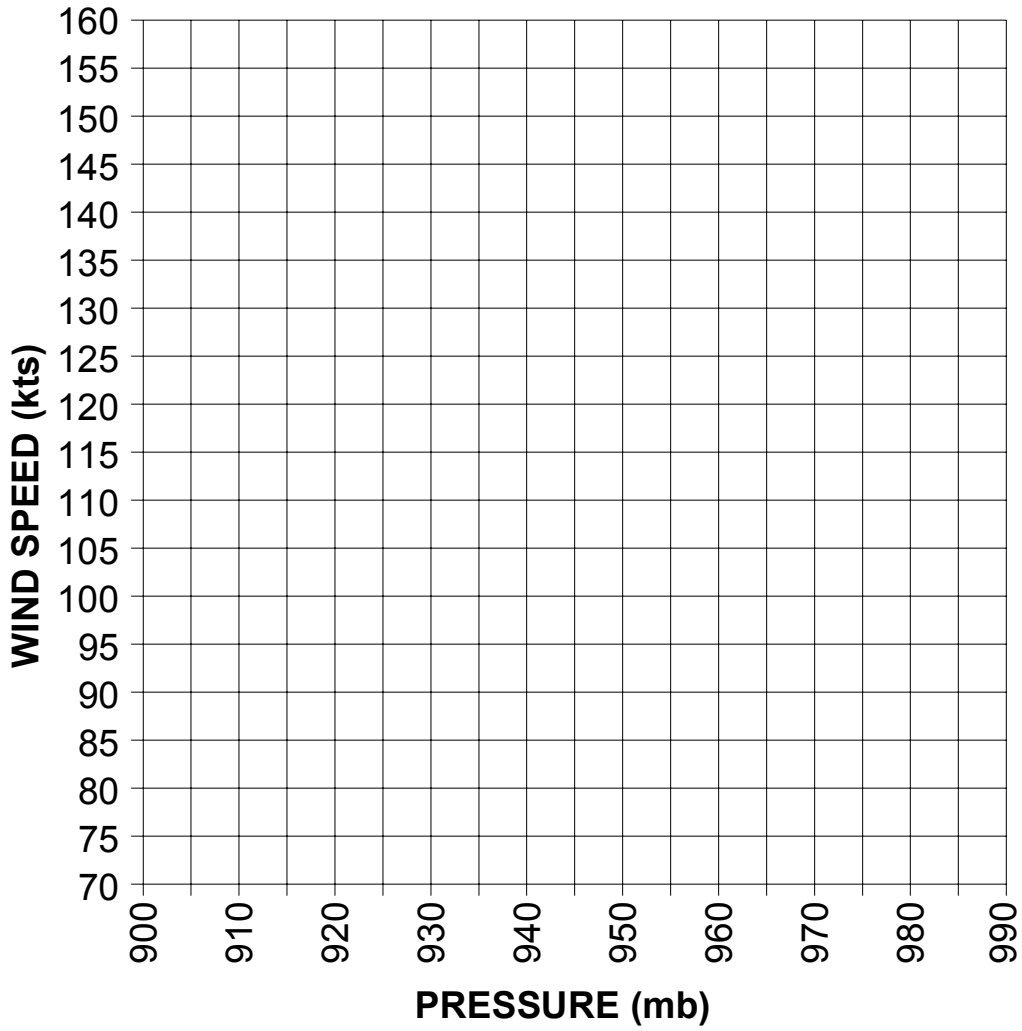
Draw a best-fit line.



B. Graph Pressure vs. Wind Speed

-Following the same directions, find the wind speed and pressure at landfall for Hurricane Claudette from Table 1.

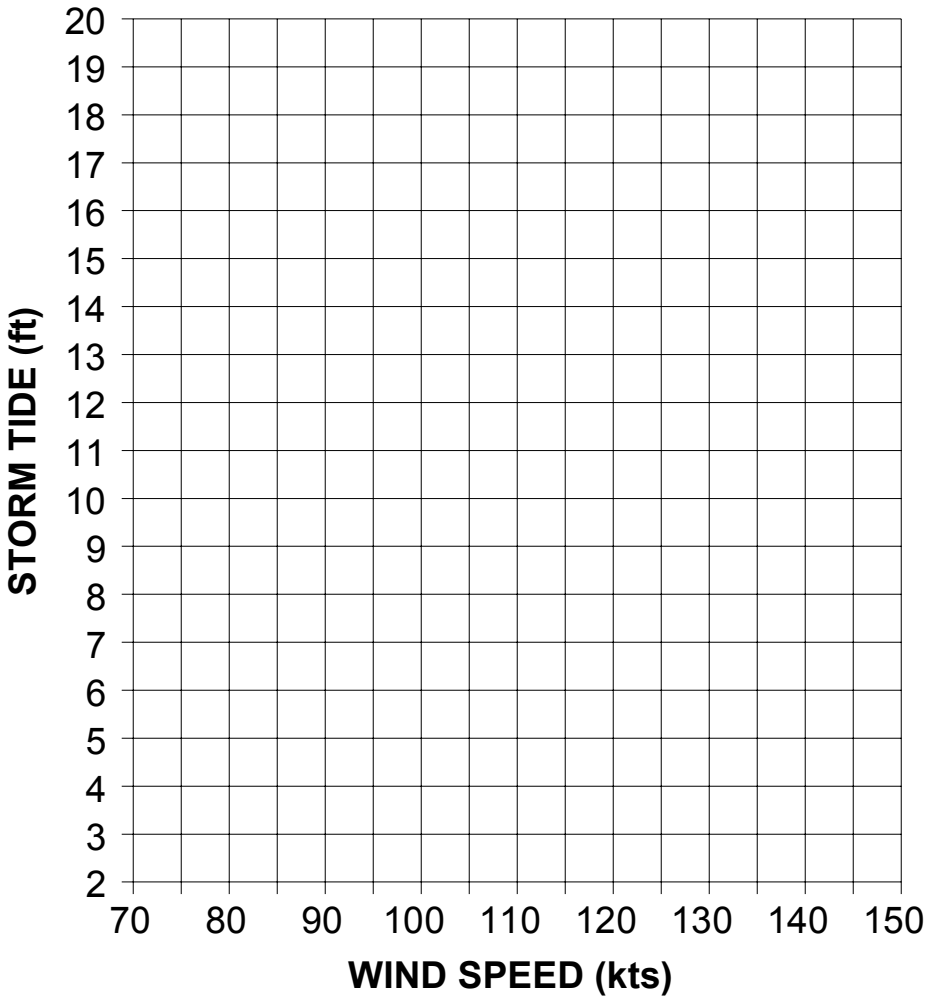
- On the following graph, plot the point where the wind speed intersects with the pressure.
- Do the same for Hurricanes Juan, Isabel, Michelle, Floyd, Bonnie and Andrew.
- Draw a best-fit line.



- Click "Back" to return to the Hurricanes "Gather Data.1" web page.
- Click "Forward" at the bottom of the page to go to "Gather Data.2."

C. Graph Tide Height vs. Wind Speed

- Using the Wind Speed and Storm Tide Height numbers from the previous two graphs, plot the point where the values intersect on the graph for Hurricane Claudette.
- Do the same for Hurricanes Juan, Isabel, Michelle, Floyd, Bonnie and Andrew.
- Draw a best-fit line.



D. Math Interpretations

- Click on the "Conversion Factors" site.

1. Convert 75 miles per hour to knots. There is 0.864 nautical mile per standard mile. One knot is one nautical mile.

2. Convert 120 miles per hour to kilometers per hour.

3. Convert 920 millibars to inches of mercury.

4. Convert 950 millibars to hPa.

- Click "Back" to return to the Hurricanes "Gather Data.2" web page.
- Click "Forward" at the bottom of the page to go to the "Gather Data.3" web page.

E. Tracking Hurricanes

- Go to <u>one</u> of the following sites.

a. If you live near the Atlantic Ocean, click on the "Atlantic Hurricane Tracking Data by Year" site.

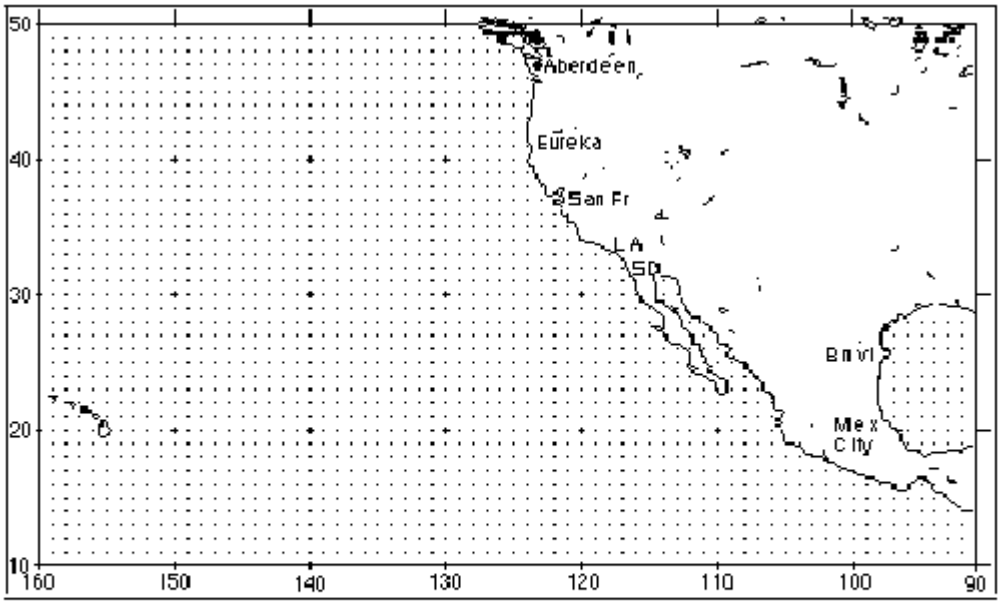
b. If you live near the Pacific Ocean, click on the "Pacific Hurricane Tracking Data by Year" site.

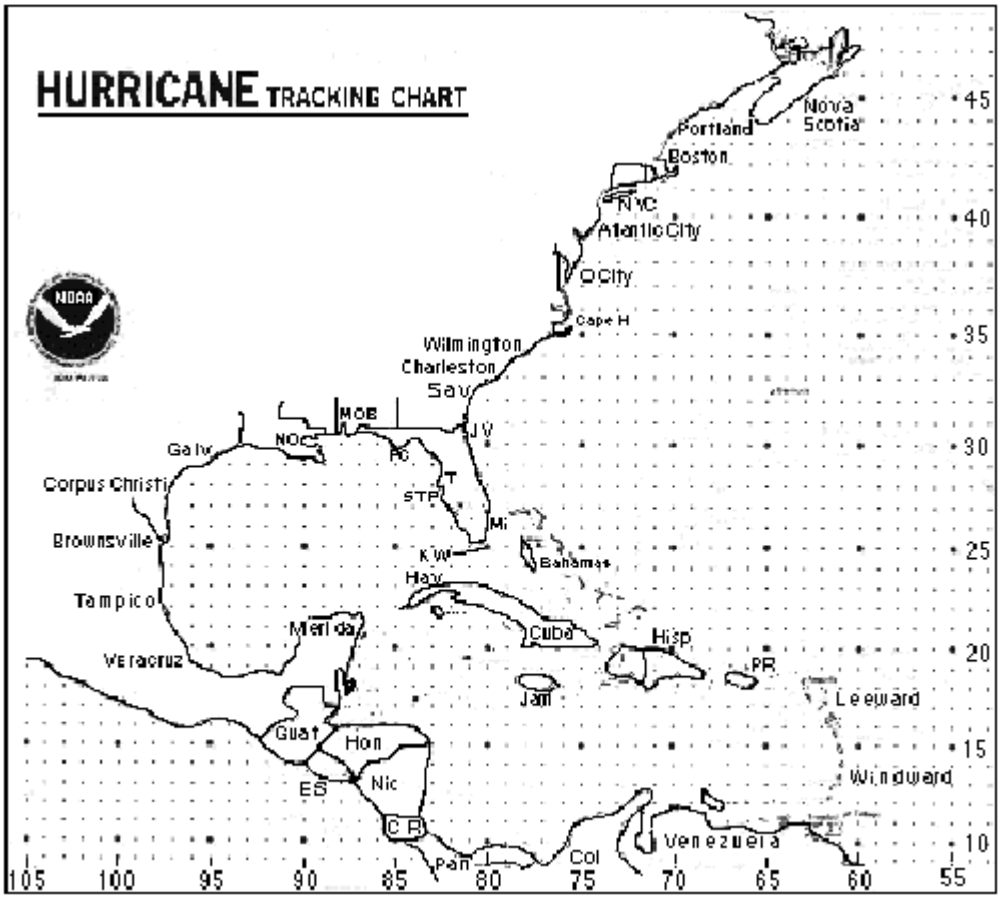
- Click on the year you were born.
- Scroll down the page and look for the worst hurricane that year and click "Details" for the hurricane.

1. Using latitude and longitude numbers, plot the path of the storm when it was classified as a hurricane on the hurricane-tracking chart on the next page.

2. Connect the plotted points to show the path of the hurricane.

3. Compare the track of the hurricane you plotted with the one on the map that shows all hurricanes for that year.


Aberdeen
Eureka
San Fr
LA
SD
Mex City
50
40
30
20
10
160
150
140
130
120
110
100
90


HURRICANE TRACKING CHART
Nova Scotia
Portland
Boston
NYC
Atlantic City
DCity
Cape H
Wilmington
Charleston
Sav
MOB
NOC
Galv
Corpus Christi
Brownsville
Tampico
Veracruz
Merida
STP
T
JV
Mi
KW
Bahamas
Hav
Cuba
Hisp
PR
Jam
Leeward
Windward
Venezuela
Col
Pan
CR
ES
Nic
Hon
Guat
45
40
35
30
25
20
15
10
105
100
95
90
85
80
75
70
65
60
55

- Click "Back" to return to the NOAA Research "Hurricanes" main page, or choose "Hurricanes" from your Bookmarks or Favorites.
- Click "Application."

IV. Application

A. Applying Graphs

- Click on "The Most Intense Hurricanes in the US 1900-1996" site.

1. Using the graphs you made in Gather Data, determine the approximate maximum sustained wind speed of the following hurricanes. Give you answer in miles per hour, not knots.

    a. Camille (#2) = _____ miles per hour
    b. Donna (#6) = _____ miles per hour
    c. Opal (#16) = _____ miles per hour
    d. Allen (#18) = _____ miles per hour
    e. Connie (#59) = _____ miles per hour

2. Using the graphs you made in Gather Data, determine the approximate storm tide of the following hurricanes.

    a. Camille (#2) = _____ feet
    b. Donna (#6) = _____ feet
    c. Opal (#16) = _____ feet
    d. Allen (#18) = _____ feet
    e. Connie (#59) = _____ feet

3. What difference does the timing of the tide make on the damage done by a hurricane?

4. Describe the types of damage that would happen if a hurricane with an intensity of 3 on the Saffir-Simpson Scale hit where you live.

- Click "Back" to return to the NOAA Research "Hurricanes" main page, or choose "Hurricanes" from your Bookmarks or Favorites.
- Click "Enrichment."

V. Enrichment Activities

A. Hurricane-Induced Building Considerations

1. Research the change in construction regulations in Florida due to the effects of Hurricane Andrew in 1992.

2. Brainstorm about the type of housing that would best weather a hurricane.

B. El Nino Effects on Hurricanes

- You can do this section only if you have completed the El Nino Activity.
- Read the following two questions before going to the sites so you know what to look for.

1. Explain the effect El Nino has on the Atlantic and Pacific hurricane seasons.

2. What effect on the number of hurricanes should El Nino have had in 1997 – 1998?

   - Click on the "1997 storm tracks for the eastern Pacific" site (a severe El Nino year.)
   - Click on the "1995 storm tracks for the eastern Pacific" (a non-El Nino year.)

- Click "Back" to return to the NOAA Research "Hurricanes" main web page, or choose "Hurricanes" from your Bookmarks or Favorites.

C. Extra Credit

1. Research the meaning of "Willie-Willie" in Australia.
2. Find out how hurricanes are named.

D. Related Web Sites

1. National Hurricane Center
   http://www.nhc.noaa.gov

2. Hurricane and Natural Disasters Brochures
   http://www.aoml.noaa.gov/general/lib/hurricbro.html

3. National Weather Service Hurricane page
   http://www.nws.noaa.gov/om/hurricane/index.shtml

4. National Weather Service Hurricane Preparedness page
   http://www.nhc.noaa.gov/HAW2/english/intro.shtml

5. Hurricane Research Division, Atlantic Oceanographic and Meteorological Laboratory
   http://www.aoml.noaa.gov/hrd/

6. Hurricanes, Unleashing Nature's Fury
   http://www.nws.noaa.gov/om/brochures/hurrbro.htm

7. NOAA's Hurricane Site
   http://hurricanes.noaa.gov/index.html

8. Aircraft Operations Center
   http://www.aoc.noaa.gov

9. Tropical Cyclones Introduction
   http://www.srh.weather.gov/jetstream/tropics/tc.htm

10. National Climatic Data Center Hurricanes page
    http://lwf.ncdc.noaa.gov/oa/climate/severeweather/hurricanes.html