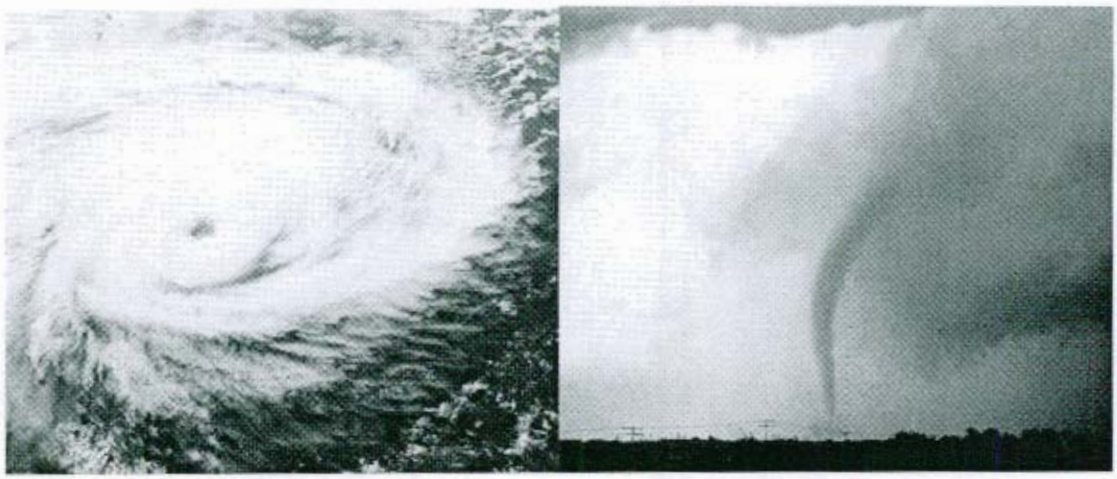
"Outrageous Weather: Hurricanes and Tornadoes, What Would You Do?"



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Overview/Description:

This project, "Outrageous Weather: Hurricanes and Tornadoes, What Would You Do?" involves hands-on and lessons and activities that are interactive in order to engage and motivate my students to become involved in the study of these two concepts involving severe weather.

The students in my classes are Special Education (SPED) students and they are able to retain more information when they are taught using a variety of learning styles. Therefore, this project addresses visual, auditory, and kinesthetic-tactile lessons and activities.

This project has been taught in a 9th Grade Varying Exceptionalities Earth Space Science class (Levels 1-3 for Reading, Math, and Science). It could be adapted to an 8th grade Earth Space Science class or higher levels of achievement (Levels 3 or higher) in 9th grade Earth Space Science classes. This project has been used with class sizes of 20 students or less, but could easily be adapted to a class of 30 or more.

Goals and Objectives:

The students will review latitude and longitude in preparation for plotting coordinates of particular hurricanes on hurricane maps. They will participate in an Internet web-based computerized interactive lab activity (Gizmo) on Hurricane Motion. Students will observe informational videos from "Brain Pop" on Tornadoes and Hurricanes. Students will read selected articles on hurricanes and tornadoes and use a variety of graphic organizers including: Compare and Contrast, KWL (What you already Know, What you want to Know, What you Learned), and Problem/Solution to organize, record, and interpret information on hurricanes and tornadoes. The students will observe videos on tornadoes and hurricanes from the Discovery Channel and participate in demonstration labs such as the "Tornado Tube" and "Discovery Tornado Lab." They will observe a variety of websites including the National Hurricane Center, National Oceanic and Atmospheric Administration, USA Today, and many others in order to research past hurricanes and tornadoes and observe simulations and interactive activities. Each of the students will present information to the class about a historical hurricane including damages that it caused and the path that it traveled.

Sunshine State Standards:

From the Next-Generation of Sunshine State Standards for Earth Space Science Grades 9-12:

SC.912.E.6.6: Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.

SC.912.E.7.1: Analyze the movement of matter and energy through the different biochemical cycles, including water and carbon.

SC.912.E.7.3: Differentiate and describe the various interactions among Earth system, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.

SC.912.E.7.5: Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.

SC.912.E.7.6: Relate the formation of severe weather to the various physical factors.

SC.912.E.7.7: Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.

SC.912.E.7.8: Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced human behavior, both individually and collectively.

SC.912.E.7.9: Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.

SC.912.P.10.4: Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature and states of matter.

From the Next-Generation of Sunshine State Standards for Science Grade 8:

SC.8.E.5.9: Explain the impact of objects in space on each other including:

1. the sun on the Earth including seasons and gravitational attraction.
2. the moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.

SC.8.E.5.10: Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.

SC.8.N.4.1: Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.

Lesson Plans:
Mrs. L. Miret
Earth Space Science

Date:

Next Generation Sunshine State Standards: SC.912.E.6.6, SC.912.E.7.1, SC.912.E.7.3, SC.912.E.7.5, SC.912.E.7.6, SC.912.E.7.7, SC.912.E.7.8, SC.912.E.7.9, SC.912.P.10.4.

Objectives: SWBAT

-KWL Graphic Organizer and Tornado Reading Article: "Tornadoes…Nature's Most Violent Storms" from National Oceanic and Atmospheric Administration.
-Discovery Tornado Lab Demonstration.
-Tornado Tube Lab Demonstration.
-Discovery Channel's Raging Planet DVD: Tornadoes and Hurricanes (show "Tornadoes" portion of DVD). Take notes on video.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test		Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	x	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts		Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork		Props/Reality		Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
X	Laboratory								

Assignment: Review notes from Tornado DVD.

Date:

Next Generation Sunshine State Standards: SC.912.E.6.6, SC.912.E.7.1, SC.912.E.7.3, SC.912.E.7.5, SC.912.E.7.6, SC.912.E.7.7, SC.912.E.7.8, SC.912.E.7.9, SC.912.P.10.4.

Objectives: SWBAT

-Tornado Internet Sites Simulations/Demonstrations.
-Latitude and Longitude Worksheet.
-Publix Hurricane Map and Guide (Read for Information/Discuss/Explain/Ask Questions)
-Assign Groups: Hurricanes from Past.
-Plot coordinates from Hurricanes and review information for presentations.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test	X	Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation		AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization		Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts	X	Peer/Group		Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality		Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
	Laboratory								

Assignment: Review Plotting Hurricanes using Latitude and Longitude.

Lesson Plans:
Mrs. L. Miret
Earth Space Science

Date:
Next Generation Sunshine State Standards: SC.912.E.6.6, SC.912.E.7.1, SC.912.E.7.3, SC.912.E.7.5, SC.912.E.7.6, SC.912.E.7.7, SC.912.E.7.8, SC.912.E.7.9, SC.912.P.10.4.
Objectives: SWBAT
-Discovery Channel's Raging Planet DVD: Tornadoes and Hurricanes (show "Hurricanes" portion of DVD).
-Gizmo Lab: Hurricane Motion.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test		Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	x	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts		Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork		Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer	X	Presentation	X	Directed Reading/Writing		
X	Laboratory								

Assignment: Complete Gizmo Lab: Hurricane Motion.

Date:
Next Generation Sunshine State Standards: SC.912.E.6.6, SC.912.E.7.1, SC.912.E.7.3, SC.912.E.7.5, SC.912.E.7.6, SC.912.E.7.7, SC.912.E.7.8, SC.912.E.7.9, SC.912.P.10.4.
Objectives: SWBAT
-Brain POP (Demo. Video and Quiz): Tornadoes & Hurricanes.
-Complete Hurricane Presentations: Plotting coordinates and information.
-Presentations due next class.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test	X	Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation		AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization		Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts	X	Peer/Group		Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
	Cooperative Learning	X	Software/Computer	X	Presentation	X	Directed Reading/Writing		
	Laboratory								

Assignment: Hurricane Presentations due next class.

Lesson Plans:
Mrs. L. Miret
Earth Space Science

Date:

Next Generation Sunshine State Standards: SC.912.E.6.6, SC.912.E.7.1, SC.912.E.7.3, SC.912.E.7.5, SC.912.E.7.6, SC.912.E.7.7, SC.912.E.7.8, SC.912.E.7.9, SC.912.P.10.4.

Objectives: SWBAT

-Presentations on Hurricanes.
-Reading Articles: FCAT Reading: "Coast and Islands Facing Era of Strong Hurricanes"
-Complete Problem/Solution Worksheet.
-Complete Graphic Organizer (Compare and Contrast Worksheet) on Hurricanes and Tornadoes (Guided on LCD Projector).

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test		Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	x	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts		Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork		Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer	X	Presentation	X	Directed Reading/Writing		
	Laboratory	X	Projector						

Assignment: Review notes and information on Hurricanes and Tornadoes for test.

Hurricane Mapping Activity:

The students will learn how to plot the coordinates of hurricanes by practicing plotting particular coordinates of a hurricane on the paper hurricane charts. First, the teacher gives each student the coordinates of a historical hurricane (some examples of historical hurricanes are the following: Andrew, Betsy, Katrina, Wilma, etc.). Each student receives a Hurricane Map (from Publix, Winn Dixie, etc.) to plot the hurricane's coordinates. The student must start with the first coordinates listed and plot the location on the hurricane map. After plotting all of the coordinates of the hurricane, the student must connect the lines to show the path of the historical hurricane. By doing this hands-on activity, the students are tracking the path of historical hurricanes. In the future, the students will be able to track a present hurricane's coordinates on a hurricane map (found at local supermarket: Publix or Winn-Dixie, etc.) by watching the local news station on television or by logging onto the Internet to find out what the coordinates are. Students will be able to track the path of a present hurricane and prepare for it by following safety procedures and guidelines. The students will also present their coordinates and the paths traveled by historical hurricanes and discuss damages caused and areas affected by the storms.

Materials and Resources:

***A computer (with Internet access) and a LCD projector are needed. (These items could be borrowed from the school's media center.)**

Latitude and Longitude Worksheets

Hurricanes simulations and websites:

Gizmo Lab: Hurricane Motion (www.explorelearning.com)

Brain Pop: Hurricanes and Tornadoes (www.brainpop.com)

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

Weather Underground Hurricane Archives:

http://www.wunderground.com/hurricane/hurrarchive.asp

Tornadoes simulations and websites:

http://whyfiles.org/013tornado/3.html

http://www.usatoday.com/weather/graphics/tornadoes/flash.htm

http://esminfo.prenhall.com/science/geoanimations/animations/Tornadoes.html

Graphic Organizers: KWL Worksheet, Compare and Contrast Worksheet, Problem/Solution Worksheet

DVD/Video: Discovery Channel's Raging Planet: Tornadoes and Hurricanes

Hurricane Tracking Lab: Hurricane Map and Guide from Publix

Tornado Tube Lab

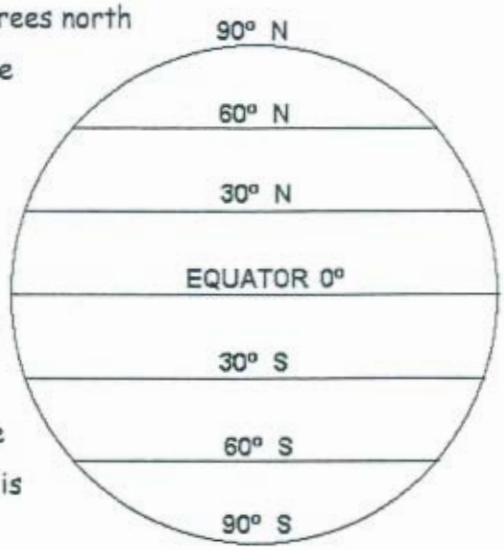
Discovery Tornado Lab

Earth Science (Geology, the Environment, and the Universe) Textbook by Glencoe/McGraw-Hill (9th Grade Earth Space Science Textbook)

Reading Articles: FCAT Reading: "Coast and Islands Facing Era of Strong Hurricanes" and "Tornadoes…Nature's Most Violent Storms" from National Oceanic and Atmospheric Administration.

What is Latitude?

Name: _____ Class: ___



Latitude is defined as a measurement of distance in degrees north and south of the equator. The word latitude is derived from the Latin word , "latus", meaning "wide."

There are 90 degrees of latitude from the equator to each of the north and south poles. Latitude lines are pictured on the globe to the right. Latitude lines are parallel, that is they are the same distance apart. In fact, they are sometimes called parallels.

At 7,926 miles (12, 756 km) in length, the equator is the longest of all lines of latitude. It divides the earth in half and is measured as 0^0 (zero degrees).

Positions on latitude lines above the equator are called "north" and are in the northern hemisphere. Miami, Florida, for example, is nearly twenty-five degrees north of the equator. Its approximate latitude is written as 25° N. Positions on latitude lines below the equator are called "south". Brisbane Australia, for example, is near the thirty degree latitude line too, but in the southern hemisphere. Its latitude is written as 30^0 S.

Complete the Following

a. Lines of latitude are _____ to the equator.

b. There are _____ degrees of latitude north and south of the equator.

c. The equator is _____ degrees.

d. Another name for latitude lines is _____ .

e. The equator divides the earth into _____ equal parts.

Write a definition of latitude.

_____

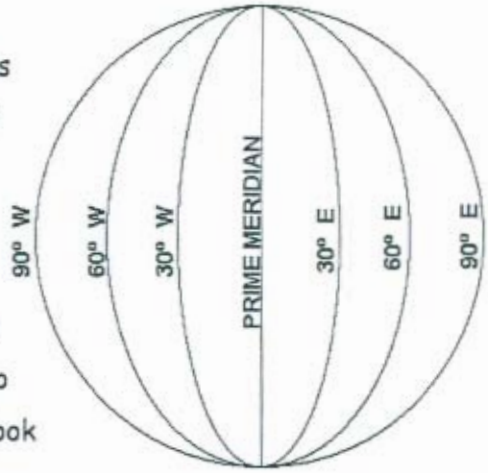
_____

_____

Prepared by Jim Cornish, Gander, Newfoundland, Canada
Graphics used with permission of The Mariners' Museum
http://www.mariner.org/age/index.htm

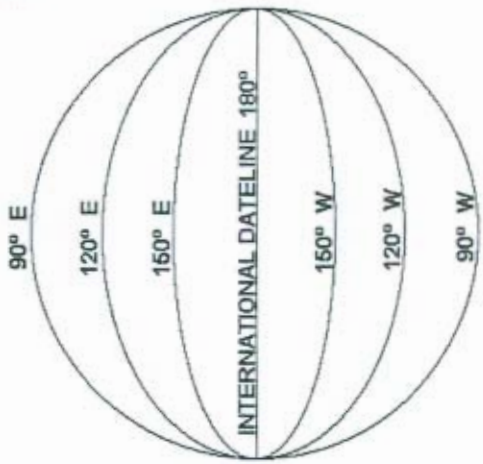
What is Longitude?

Longitude is defined as measurement of distance in degrees east or west of the prime meridian. The word longitude is derived from the Latin word, "longus", meaning "length". The prime meridian divides the earth in half too. It is also 0°. It passes through the community of Greenwich, England.



The prime meridian, as do all other lines of longitude, pass through the north and south pole. This is shown in the diagrams to the right. Longitude lines are not parallel. They make the earth look like a peeled orange.

There are 180 lines of longitude on each side of the prime meridian. But on the opposite side, the prime meridian is not zero degrees but 180°. Here, it is called the International Date line.



Longitude lines to the left of the prime meridian give locations west, in the western hemisphere. Longitude lines to the right of the prime meridian give locations east, in the eastern hemisphere. Miami, Florida, for example, is near the 80 ° line of longitude. It is west of the prime meridian and is written 80° W.

Complete the Following

a. Longitude lines connect the _____ pole with the _____ pole.

b. The line of 0° longitude is called the _____ .

c. Longitude lines give directions _____ and _____ of the prime meridian.

d. There are _____ degrees of longitude each side of the prime meridian.

e. Longitude lines are not _____ like latitude lines.

Write a definition of longitude.

_____

_____

_____

Prepared by Jim Cornish, Gander, Newfoundland, Canada
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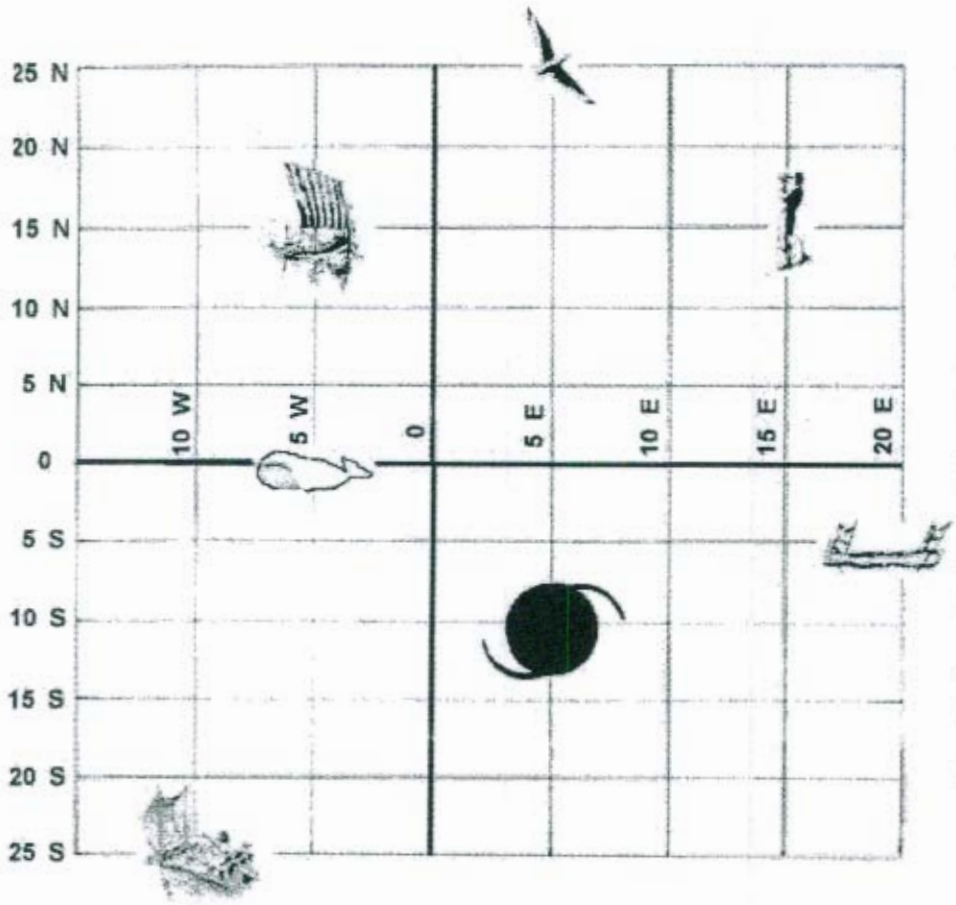
http://www.mariner.org/age/index.htm

Using Latitude and Longitude

To find your exact location on a map, you need to determine which latitude line and which longitude line meet where you are standing. When writing locations, the latitude is given first. Miami, Florida then, has a location of 25° North and 80° West. This is usually written in a short form as 25° N 80° W.

Give the latitude and longitude of the shapes positioned on the grid below.



Viking Ship _____

Hurricane _____

Tourist _____

Rafter _____

Whale _____

Canoeists _____

Flying Bird _____

Prepared by Jim Cornish, Gander, Newfoundland, Canada
Graphics used with permission of The Mariners' Museum
http://www.mariner.org/age/index.htm

Exploration Guide » Hurricane Motion

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A large hurricane is one of the most destructive forces on Earth. Less than a hundred years ago, these storms often struck completely without warning, causing enormous damage and loss of life. The storm that surprised Galveston, Texas, in 1900 cost nearly 12,000 lives.

Today, modern weather observation makes it impossible for a storm of this kind to catch the public unaware. Hurricanes are tracked by satellite and radar, almost from the moment they begin to form, and their intensities and projected paths are in the news frequently.

Still, accurately predicting the future path of a hurricane is a challenge. There is still much more to be learned.

Hurricane Observation

In this activity, you will explore some of the modern techniques used to observe and track hurricanes.

1. In the Gizmo™, be sure that **Practice** mode is selected. Also be sure that **Show hurricane** and **Radar** are checked. The Gizmo shows a radar image of the rainfall from the hurricane. Blue indicates lighter rainfall. Heavier rain is shown with yellow, and then orange, and finally red indicates the heaviest rainfall.

   a. What do you observe about the motion of the hurricane? What is the direction of the hurricane's rotation, clockwise or counterclockwise? Hurricanes rotate due to the Coriolis effect. In the northern hemisphere, this rotation is counterclockwise. In the southern hemisphere, the rotation is clockwise.

   b. Where within the hurricane is the rainfall the heaviest? Where is it the lightest?

2. Under Show hurricane, select **Satellite.** This view is a series of actual photographs taken from satellites high above the Earth. These views show the clouds associated with the hurricane.

   a. Which is larger, the area of rainfall or the area of cloud cover?

   b. Where in the storm is the cloud cover most dense? Where is it the least dense?

   c. The center of rotation of a hurricane is called the eye. Find the eye of this hurricane. When people refer to the location of a hurricane, they are actually referring to the location of the eye. At the top left corner of the Gizmo, check **Grid.** What is the location (longitude and latitude) of this hurricane?

3. Check **Show weather station data.** Be sure that **Wind**, **Pressure**, and **Cloud cover** are selected. Notice the symbols shown at weather stations A, B, and C. The tail of the symbol provides information about wind speed and direction. The circular part provides information about cloud cover, as shown below:

Degree of Cloud Cover

Clear	1/8	1/4	3/8	1/2	5/8	3/4	7/8	Overcast
								

   a. Drag the hurricane to a position between stations A and C. What is the cloud cover at each of the three stations? Drag the hurricane to a position between stations A and B. What is the cloud cover at each station now? Repeat with the hurricane between stations B and C.

   b. The tails on each symbol show which direction the wind is **coming from**. The flags on each tail indicate

the wind's speed. A short line extending from the tail indicates 5 mph of wind. A longer line indicates 10 mph. A triangular flag indicates 50 mph of wind. Add all of the flags together to get the wind's speed. For example, the symbol below means that the wind is out of the north at 65 mph and the skies are completely covered with clouds.

Place the hurricane in three different locations again: between stations A and B, between stations A and C, and between stations B and C. At each position, record the wind speed and direction at all three weather stations.

4. The air pressure, measured in millibars (mb), is indicated to the upper right of each station.

   a. Drag the hurricane slowly toward station A. What do you notice about the air pressure at station A as the hurricane gets closer?

   b. Drag the hurricane over station A until you find the lowest air pressure. What part of the hurricane has the lowest air pressure?

   c. Hurricanes originate in areas of warm, humid air near the equator. The hot air rises, forming a region of low pressure. How could you use air pressure to monitor and track a hurricane?

Hurricane Prediction

In this activity, you will use data from the three weather stations to try to determine the current position and the future path of a hurricane.

1. Uncheck **Show hurricane.** Be sure that **Show weather station data** is still selected, along with **Wind** and **Cloud cover.** Also, be sure **Grid** is still selected. Check **Experiment** to start the simulation. A bar indicating the passage of time appears below. When the simulation reads 12:00 PM on Day 1, click **Pause** (⏸).

   a. What is the cloud cover at each weather station? What is the wind speed and direction at each station? What is the air pressure at each station? Do you think these readings indicate a nearby hurricane? Why or why not?

   b. Click **Play** (▶). When Day 1 ends (at 12:00 AM on Day 2), click **Pause**. What are the cloud cover and wind readings at each station? What is the pressure at each station?

   c. Click **Play** again. When one or more of the stations has full cloud cover and wind speeds of 35 mph or more, click **Pause**. Based on data from the three weather stations, estimate where the eye of the hurricane is currently located. State your answer using longitude and latitude. Select **Show hurricane** to check your answer.

   d. Uncheck **Show hurricane** and run the simulation for another twelve hours. Then click **Pause** and estimate the new position of the hurricane. Once again, check your answer by selecting **Show hurricane.** Repeat the process several more times.

2. Now you will get to try your hand as a weather forecaster. With all of the settings as they were in the previous activity (be sure that **Show hurricane** is NOT checked and that you are in **Experiment** mode), click **Reset.** Monitor the weather station data from the new hurricane.

a. Click **Pause** and estimate the position of the hurricane several times. Each time, check your answer by selecting **Show hurricane**. Also record the actual position of the eye and the time that you made the observation.

b. After you have data for four or five positions and times, try to predict the where the hurricane will be twelve hours later and twenty-four hours later. (Again, state your predictions in degrees longitude and latitude.) Use the Gizmo to check your predictions. Write down the actual results. How close were your forecasts?

c. Click **Reset** ( ) and try again with a new hurricane. Do your predictions for future positions improve the more you try this? If you did this enough, do you think you could predict future positions of hurricanes perfectly? Why or why not?

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HURRICANES

1 Which of the following is a true statement about hurricanes?

A They only affect tropical areas

B They cannot be measured on any scientific scale

C Their winds always top 117 kilometers per hour

D They cause more deaths every year than tornadoes and earthquakes

2 Which word best describes the eye of a hurricane?

A Tranquil

B Stormy

C Windy

D Hot

3 If a hurricane destroyed an entire U.S. city, what category would it most likely be?

A Category 1 or 2

B Category A or B

C Category X or Y

D Category 4 or 5

4 In which U.S. state would a hurricane most likely strike?

A 

B 

C 

D 

5 How are tropical storms in the Northern Hemisphere different from tropical storms in the Southern Hemisphere?

A The winds spin faster in the Southern Hemisphere

B Tropical storms cause more rain in the Southern Hemisphere

C Tropical storms don't turn into hurricanes in the Southern Hemisphere

D The winds spin in opposite directions

6 Which country would most likely be affected by a typhoon?

A The United States

B Japan

C Spain

D Brazil

7 What can you infer about low and high-pressure air masses from the movie?

A Low pressure systems are associated with stormy weather

B High pressure systems are associated with cyclones

C Low and high pressure systems must meet to form a hurricane

D Low pressure systems are associated with the Southern Hemisphere

8 Which device do meteorologists use to predict where hurricanes will land?

A 

B 

C 

D 

9 What happens immediately after a hurricane makes landfall?

A It gets stronger

B It gets weaker

C Its winds pick up speed

D It starts hailing

10 If you heard a hurricane watch announced over the radio, what would it mean?

A A tropical storm at sea has been upgraded to a hurricane

B A big hurricane is projected to hit land within 12 hours

C A small hurricane has been upgraded to a strong hurricane

D A big hurricane is projected to hit land within 36 hours

TORNADOES

1 **Place the following events in sequence: A) A tornado touches down; B) An updraft tilts a column of spinning air; C) Cool, dense air begins descending**

A C, B, A

B B, C, A

C A, B, C

D C, A, B

2 **Where could you find a supercell forming?**

A In an area that's been devastated by tornadoes

B Only in tropical regions

C In the atmosphere

D In a tornado's area of rotation

3 **A tornado is most likely to form under which conditions?**

A 

B 

C 

D 

4 **In the phrase, "F5 tornadoes can obliterate entire towns," what does "obliterate" mean?**

A Wreck

B Lift into the air

C Blow through

D Descend on

5 **Which of the following is the best depiction of an F5 tornado?**

A 

B 

C 

D 

6 **Which word best describes the duration of most tornadoes?**

A Prolonged

B Instantaneous

C Lengthy

D Brief

7 **How would a waterspout--a tornado that forms over water--look different than a tornado that forms over land?**

A It wouldn't be as dark in color

B It wouldn't be as powerful

C Its winds would rotate in the opposite direction

D It wouldn't be accompanied by thunderstorms

8 **Which of the following is an opinion about tornadoes?**

A They occur more frequently in the Midwestern United States than on the coasts

B They can cause millions of dollars' worth of damages

C F5 tornadoes are rare

D F1 tornadoes aren't worth worrying about

9 **Which of the following is a true statement about tornadoes?**

A Strong tornadoes last longer than weaker ones

B Even the largest tornadoes are just a few meters wide

C Tornadoes can destroy mobile homes, but not homes with solid foundations

D Strong tornadoes often form from weak thunderstorms

10 **Where's the best place to go when a tornado warning has been issued for your area?**

A Your bedroom

B Your basement

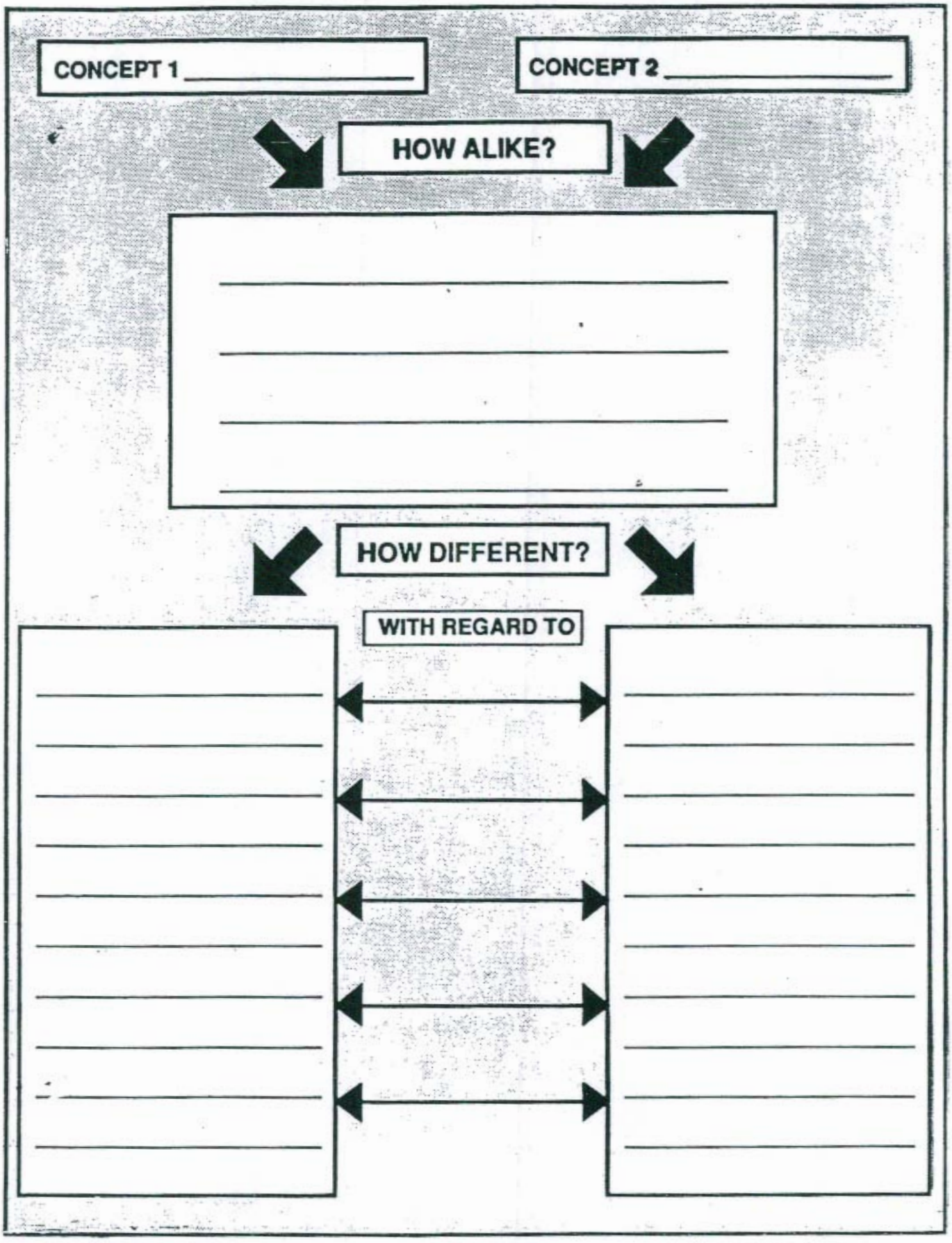
C Your attic

D Your car

Know?	Predict?	Learned?	Strategies	Apply?
What do I already Know?	What do I expect/want to find out?	What did I find out?	How did I find out?	How am I going to use what I learned?

Source unknown.
Provided by Kathy McSheehy, Consultant.

COMPARE AND CONTRAST DIAGRAM



Name_____

The Problem-Solution Two-Column Notes graphic organizer can be used with informational and literary text, and with personal situations (Santa, 1996).

Write the following questions in the left-hand column:

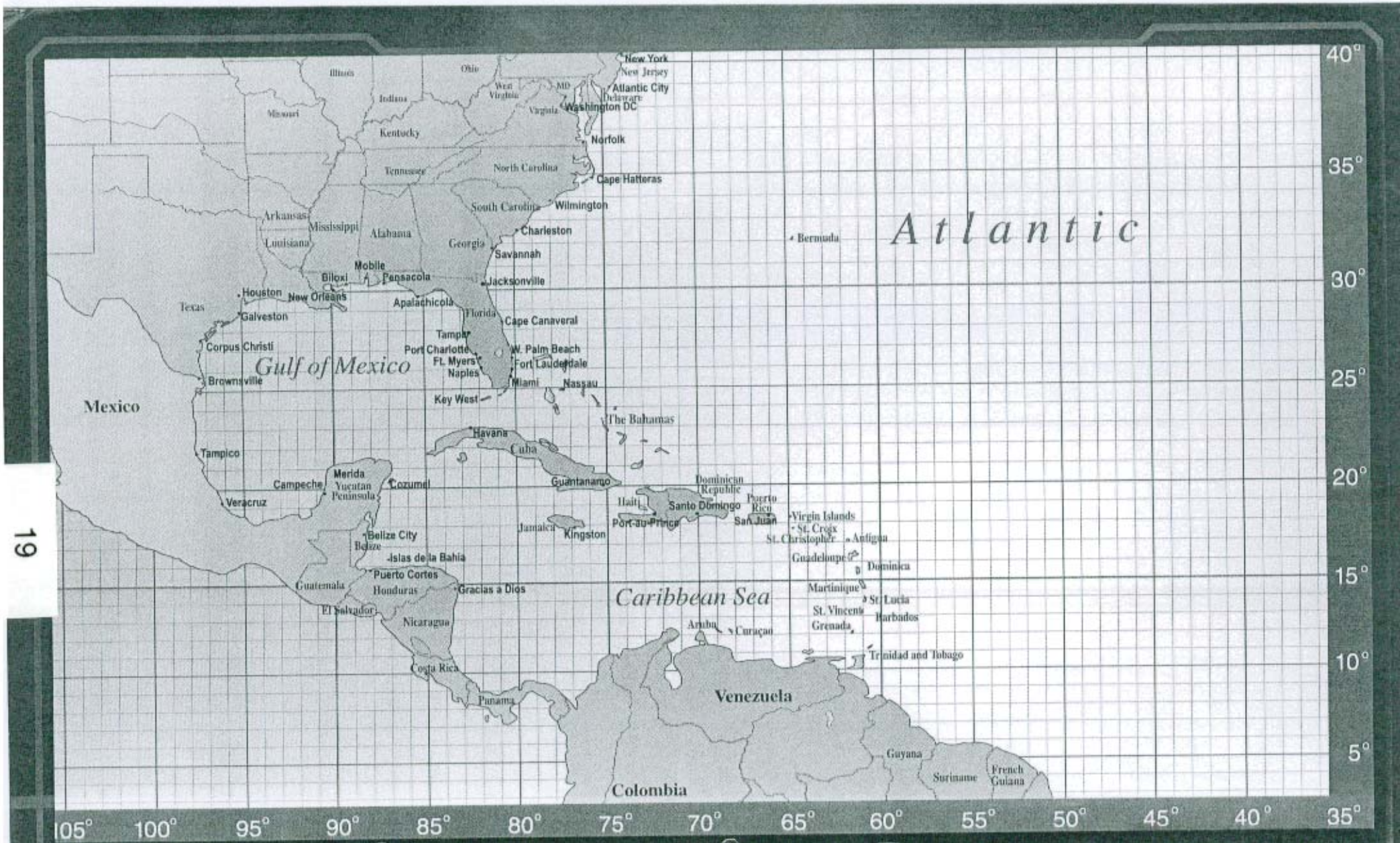
1. What is the problem or issue?
2. What are the effects of the problem?
3. What are the causes of the problem?
4. What are the solutions to the problem?

Record the answers to the questions in the right-hand column.

1. What is the Problem or Issue?	
2. What are the Effects?	
3. What are the Causes?	
4. What are the Solutions?	


HURRICANE
MAP & GUIDE
2009
MICCOSUKEE
TRIBE OF INDIANS OF FLORIDA
CONE ON YOUR PHONE
PHIL FERRO
CHIEF METEOROLOGIST
Publix
WSVN
HOT 105 FM
Today's R&B Hits and Oldies
97.3 THE COAST
WEDR-FM
99JAMZ
Miami • Ft. Lauderdale
93ROCK
SOUTH FLORIDA'S PURE ROCK

18



SAFFIR-SIMPSON SCALE

HURRICANE	WIND SPEED
CATEGORY 1	74 - 95 MPH
CATEGORY 2	96 - 110 MPH
CATEGORY 3	111 - 130 MPH
CATEGORY 4	131 - 155 MPH
CATEGORY 5	155 + MPH

HURRICANE NAMES 2009

ANA	HENRI	ODETTE
BILL	IDA	PETER
CLAUDETTE	JOAQUIN	ROSE
DANNY	KATE	SAM
ERIKA	LARRY	TERESA
FRED	MINDY	VICTOR
GRACE	NICHOLAS	WANDA

HURRICANE SUPPLIES

FOOD SUPPLIES

- Water (one gallon per person per day for at least 3 days)
- Cookies
- Crackers
- Snacks
- Canned Meats & Fish
- Canned Fruits & Vegetables
- Canned Soups
- Canned Puddings
- Canned Powdered or Shelf-pack Milk
- Dried Fruit
- Drinks
- Cereal
- Condiments
- Peanut Butter & Jelly
- Instant Coffee & Tea
- Ice & Ice Chest
- Pet Food

PERSONAL SUPPLIES

- First Aid Kit
- Baby Food and/or Formula
- Baby Wipes
- Disposable Diapers
- Soap
- Shampoo
- Liquid Detergent & Disinfectant
- Aspirin or Non-Aspirin Pain Reliever
- Toiletries
- Feminine Hygiene Products
- Insect Repellent
- Sunscreen
- Prescriptions (2 week supply)
- Toilet Paper
- Rain Gear

OTHER SUPPLIES

- Full Tank of Gas
- Cash (debit cards will be limited if ATM power is lost)
- Battery-operated Radio & Clock
- Extra Batteries
- Manual Can Opener
- Disposable Plates, Cups & Utensils
- Chlorine Bleach
- Water Purification Tablets
- Plastic Garbage Bags
- Aluminum Foil
- Charcoal
- Lighter Fluid
- Water-Proof Matches
- Fire Extinguisher
- Hammer
- Nails
- Wrench
- Pliers
- Rope
- Masking Tape
- Duct Tape
- Sterno
- Fuel for Generators & Cars (only in approved containers)
- Portable Battery-powered Lanterns
- Sleeping Bags
- Tarp

ENTERTAINMENT

- Books & Magazines
- Cards
- Games & Toys for Children

HABITAT FOR HUMANITY

Looking for hurricane shutters?
Contact the Habitat for Humanity ReStore:
Dade 305-637-4913
Broward 954-783-7771
For more information on supplies visit WSVN.com or Publix.com/storm

HURRICANE TIPS

BEFORE A HURRICANE

- Create a family plan
- Decide where you will ride out the storm
- Review insurance policies
- Find out where the nearest shelter is
- Keep trees and shrubs trimmed

WHEN A HURRICANE THREATENS

- Fill car with gas
- Get cash
- Stock up on supplies
- Bring in lawn furniture and other loose items
- Anchor objects that can't be brought inside
- Secure boat
- Board or shutter windows
- Set refrigerator and freezer to coldest settings
- Prepare emergency water supplies
- Freeze water in plastic jugs
- Do not completely drain swimming pools
- Place valuables and personal papers in waterproof containers and store up high

For more information on preparedness, visit WSVN.com or Publix.com/storm

DURING A HURRICANE

- Stay indoors away from windows
- Take refuge in a small interior room, closet or hallway
- Keep a battery-powered radio and flashlight with you
- Maintain a clear escape path in case of fire
- Keep mattress nearby for protection
- Close all interior doors

AFTER A HURRICANE

- Remain indoors until the official "all clear" is given
- Do not use your telephone unless it's an emergency
- Do not call 911 except for life-threatening situations
- Use charcoal and gas grills only outside
- Only use a generator outside
- Avoid driving because of dangerous debris on the roads
- Stay away from downed power lines
- Do not wade in floodwaters
- Treat all intersections as 4-way stops if traffic lights aren't working

HURRICANE TERMINOLOGY

TROPICAL WAVE

A cluster of clouds and/or thunderstorms without a significant circulation and generally moving from east to west through the tropics.

TROPICAL DEPRESSION

A cluster of clouds and/or thunderstorms with a center of circulation and sustained wind speeds of less then 39mph.

TROPICAL STORM

An organized system of strong thunderstorms with top sustained winds of 39-73mph. Tropical storms can quickly develop into hurricanes. Storms are named when they reach tropical storm strength.

TROPICAL STORM WATCH

Tropical storm conditions are possible in the specified area of the watch, usually within 36 hours.

TROPICAL STORM WARNING

Tropical storm conditions are expected in the specified area of the warning within 24 hours.

TORNADO

Tornadoes occur usually in severe thunderstorms when wind changes direction and height, causing rotation. Wind speeds range from 40-318mph. Hurricanes may also spawn tornadoes especially in the outer rain bands. These tornadoes could cause more wind damage than the hurricane itself. This may have occurred during Hurricane Andrew in 1992. About 10 percent of fatalities in hurricanes are caused by tornadoes.

HURRICANE

An intense tropical weather system with a sustained wind speed of 74mph or higher.

HURRICANE EYE

The center of the hurricane. Wind and rain may stop for periods ranging from a few minutes to more than an hour. After the eye passes, the hurricane will pick up again from the opposite direction, often with greater force than before.

HURRICANE WATCH

Hurricane conditions are possible in the specified area of the watch, usually within 36 hours. During a hurricane watch, prepare to take immediate action to protect your family and property in case a hurricane warning is issued.

HURRICANE WARNING

Hurricane conditions are expected in the specified area of the warning within 24 hours. Complete all storm preparations and immediately follow local emergency management officials' advice about evacuating dangerous or low-lying locations.

STORM SURGE

A push of sea water up to about 20 feet high arrives with a hurricane, and can affect more than 100 miles of coastline. Evacuation zones are identified by their likelihood of being flooded by this rising water, which is responsible for most hurricane deaths.

Read the article "Coasts & Islands Facing Era of Strong Hurricanes " before answering Numbers 1 through 8.

Coasts & Islands Facing Era of Strong Hurricanes

By ANDREW C. REVKIN

The Atlantic Seaboard and the Caribbean face 10 to 40 years of stronger and more frequent hurricanes, a new analysis of weather data shows.

As a result, crowded coastlines and islands are confronted with the greatest risk of devastation in a generation, said the scientists who conducted the study.

Many meteorologists said the new analysis provided the firmest evidence yet that cycles in ocean and atmospheric conditions that suppressed big storms from 1971 to 1994 had shifted into a storm-spawning state.

The number and power of storms first jumped in 1995, but only now have enough years passed to measure a significant trend, the researchers said.

In a paper in today's issue of *Science*, they say the driving force is a periodic warming of the Atlantic north of the Equator and a simultaneous drop in wind shear, the difference between trade winds near the surface and winds at higher altitudes.

Tropical storms thrive on energy and moisture supplied by warmer water. In addition, the lack of clashing winds aloft allows the resulting cyclones to mushroom miles high, the researchers reported.

Conditions were similar from the 1920's through the 1960's, the study said. But coasts that were sparsely populated then are now dense with people, high-rise apartment buildings and summer homes, said Stanley B. Goldenberg, the lead author of the study and a meteorologist at the National Oceanographic and Atmospheric Administration's hurricane research center in Miami.

The greater frequency of stronger storms, combined with more people and buildings, spells a far greater risk of having a storm become a $100 billion disaster, Mr. Goldenberg said.

"It's like shooting arrows at a target," he said. "The more arrows you shoot, the more likely you are to get a bull's-eye. The problem now is there are not only more arrows, but there are more targets because of the coastal buildup."

In the Caribbean the biggest risk is of enormous loss of life. In the United States, it is enormous losses of property, Mr. Goldenberg said.

"It's not only the number of new buildings, but their heights," Mr. Goldenberg said. "Recent research here has shown that in strong storms, at around 300 to 500 feet you get tremendous peaks in winds" that can have twice the force of winds at the surface. Those potent gusts, he said, can easily rip the skin off a skyscraper.

In the study, the scientists said the return to cooler waters and more wind shear—and thus less stormy times—could happen in 10 years, but was likely to persist much longer.

Three women clean soiled belongings in a puddle outside their flooded house in Brache, Haiti. A flow of mud invaded their house and many others situated near the River Momance when it overflowed in the wake of Hurricane Georges.

They said no one knew what drove the cycle of warming and cooling in the North Atlantic, and the relationship between the water temperature and wind shifts was being studied.

Other scientists injected a note of caution, saying the recent string of stormy years was still too short to constitute a clear trend.

In a separate analysis in *Science*, Dr. Lennart Bengtson, a climatologist at the Max Planck Institute for Meteorology in Hamburg, Germany, said patterns of hurricane activity were nearly impossible to discern with only a few decades of data.

But he agreed that countries with vulnerable coasts could suffer huge economic losses if they did not prepare for the worst and the worst happened.

"A change to what was typical, say, for 1920 to 1960 would create a potentially serious situation requiring most urgent attention," he wrote in *Science*.

Dr. Bengtson and the authors of the new study said the link between warmer seas and hurricane patterns did not necessarily mean that global warming would spawn more such storms. One reason given by Dr. Bengtson was that, in a generally warmer world, the air above the ocean would warm as well as the water, reducing the contrast that drives the formation of storms.

The new study generated a picture of a tempestuous future by closely tracking sea temperature and wind shear measurements over the last century—taken by ships and weather balloons—and comparing patterns with the frequency, severity and tracks of hurricanes from the 1940's until now.

The team limited its full analysis to 1944 to 2000, a stretch with the best data.

Graphs of hurricane frequency meshed well with graphs of water temperature, particularly in the region west of the bulge of Saharan Africa, where most tropical storms begin.

Although the relationship between the shifts in water temperature and wind shear are still not understood, the pattern is consistent and clear, said Dr. Christopher W. Landsea, a colleague of Mr. Goldenberg at the hurricane center and a co-author of the paper. "The atmosphere and ocean are talking to each other," Dr. Landsea said.

The research adds detail and new lines of evidence to earlier predictions of a stormier future by another of the co-authors, Dr. William M. Gray of Colorado State University, and to separate studies by Dr. James B. Elsner, a hurricane authority at Florida State University.

There is still plenty of variability year to year, with the recent quiet stretch including, for example, the devastating Hurricane Andrew in 1992. So there is no reason to think that the 2001 hurricane season or any particular coming year will be exceptionally catastrophic, the scientists said.

And plenty of other weather factors and changes influence hurricanes. Most notable is El Niño, a condition that develops in the Pacific once or twice a decade and suppresses hurricanes by shifting eastward-flowing winds.

But already, the researchers said, 1995 to 2000 had hurricanes form at a rate twice as great as seen in the preceding quiet period. Moreover, the frequency of strong storms, those with sustained winds of more than 110 miles per hour, is 2.5 times as high as it was.

They added that the recent stormy years have also seen a five-fold increase in hurricanes in the Caribbean, including Hurricane Mitch in October 1998, which killed more than 11,000 people.

The prospect of more exceptionally strong storms is particularly troubling because their destructive power rises enormously for even a small increase in wind speed. For example, Mr. Goldenberg said, winds of 130 m.p.h. have almost double the punch of winds of 100 m.p.h.

"The strong storms produce more than 80 percent of all hurricane damage even though they only account for one-fifth of the storms that make landfall," Dr. Landsea said.

Answer questions 1–8. Base your answers on the article "Coasts & Islands Facing Era of Strong Hurricanes."

1 Which statement best expresses the main idea of the article?

A. There will be more fatalities from hurricanes in the near future.

B. There will be more and stronger hurricanes in the coming years.

C. There will be increased cycles of warming and cooling in the Atlantic.

D. There will be unprecedented property damage from hurricanes this year.

2 Tropical storms get their energy and moisture from

F. trade winds.
G. wind shears.
H. cooler water.
I. warmer water.

3 Which of the following facts best supports the main idea of the article?

A. Countries should prepare for the worst now to avoid huge economic losses.
B. The El Niño weather pattern suppresses hurricane activity by shifting winds.
C. From 1995 to 2000, hurricanes formed at twice the rate as the previous quiet period.
D. Scientists do not understand the relationship between water temperature and wind shear.

4 In what way is the Caribbean affected differently by hurricanes than the United States?

F. The Caribbean has more fatalities from hurricanes.
G. The Caribbean has more property damage from hurricanes.
H. Hurricanes in the Caribbean are stronger than U.S. hurricanes.
I. Hurricanes in the Caribbean have a greater economic impact than U.S. hurricanes.

5 What can you infer from the following sentence from the article?

The team limited its full analysis to 1944 to 2000, a stretch with the best data.

A. Data provided for those years was unreliable.
B. Data on hurricanes before 1944 was unreliable.
C. Results from studying this time span will be accurate.
D. Hurricane studies normally cover a shorter time span.

6 Where do most tropical storms originate?

F. the Equator
G. the Caribbean
H. the North Atlantic
I. west of Saharan Africa

7 READ THINK EXPLAIN Why do hurricanes pose a greater threat in the coming years than in the past? Support your answer with details and information from the article.

8 Read the following sentence.

> **In a separate analysis in *Science*, Dr. Lennart Bengtsson . . . said patterns of hurricane activity were nearly impossible to discern with only a few decades of data.**

What does *discern* mean?

A. miss
B. detect
C. study
D. prevent

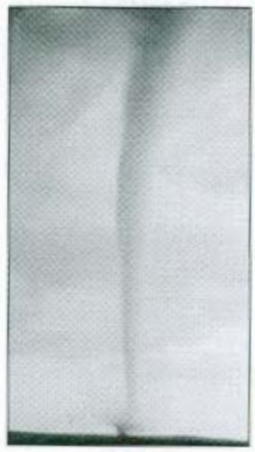
tornadoes....

Nature's Most Violent Storms

Adapted from: A PREPAREDNESS GUIDE Including Safety Information for Schools U.S. DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration National Weather Service September 1992 (NOAA, FEMA, The American Red Cross); PDF version

Tornado!

Although tornadoes occur in many parts of the world, these destructive forces of nature are found most frequently in the United States east of the Rocky Mountains during the spring and summer months. In an average year, 800 tornadoes are reported nationwide, resulting in 80 deaths and over 1,500 injuries. A tornado is defined as a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of one mile wide and 50 miles long. Once a tornado in Broken Bow, Oklahoma, carried a motel sign 30 miles and dropped it in Arkansas!



Greg Stumpf

What causes tornadoes?

Thunderstorms develop in warm, moist air in advance of eastward-moving cold fronts. These thunderstorms often produce large hail, strong winds, and tornadoes. Tornadoes in the winter and early spring are often associated with strong, frontal systems that form in the Central States and move east. Occasionally, large outbreaks of tornadoes occur with this type of weather pattern. Several states may be affected by numerous severe thunderstorms and tornadoes.

During the spring in the Central Plains, thunderstorms frequently develop along a "dryline," which separates very warm, moist air to the east from hot, dry air to the west. Tornado-producing thunderstorms may form as the dryline moves east during the afternoon hours.

Along the front range of the Rocky Mountains, in the Texas panhandle, and in the southern High Plains, thunderstorms frequently form as air near the ground flows "upslope" toward higher terrain. If other favorable conditions exist, these thunderstorms can produce tornadoes.

Tornadoes occasionally accompany tropical storms and hurricanes that move over land. Tornadoes are most common to the right and ahead of the path of the storm center as it comes onshore.

Tornado Variations

- Some tornadoes may form during the early stages of rapidly developing thunderstorms. This type of tornado is most common along the front range of the Rocky Mountains, the Plains, and the Western States.
- Tornadoes may appear nearly transparent until dust and debris are picked up.
- Occasionally, two or more tornadoes may occur at the same time.

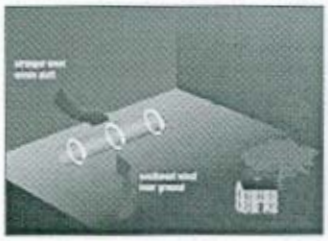
Colorado Tornado (David Blanchard)

Waterspout

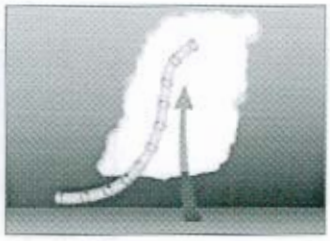
- Waterspouts are weak tornadoes that form over warm water.
- Waterspouts are most common along the Gulf Coast and southeastern states. In the western United States, they occur with cold late fall or late winter storms, during a time when you least expect tornado development.
- Waterspouts occasionally move inland becoming tornadoes causing damage and injuries.

Dr. Joseph Golden (NOAA)

How Do Tornadoes Form?



▲ Before thunderstorms develop, a change in wind direction and an increase in wind speed with increasing height creates an invisible, horizontal spinning effect in the lower atmosphere.



▲ Rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical.

▲ An area of rotation, 2-6 miles wide, now extends through much of the storm. Most strong and violent tornadoes form within this area of strong rotation.

Woodward OK (Ron Przybylinski)

▲ A lower cloud base in the center of the photograph identifies an area of rotation known as a rotating wall cloud. This area is often nearly rain-free. Note rain in the background.

Woodward OK (Ron Przybylinski)

▲ Moments later a strong tornado develops in this area. Softball-size hail and damaging "straight-line" winds also occurred with this storm.

Tornadoes Take Many Shapes and Sizes

Weak Tornadoes

- 69% of all tornadoes
- Less than 5% of tornado deaths
- Lifetime 1-10+ minutes
- Winds less than 110 mph

Strong Tornadoes

- 29% of all tornadoes
- Nearly 30% of all tornado deaths
- May last 20 minutes or longer
- Winds 110-205 mph

Violent Tornadoes

- Only 2% of all tornadoes
- 70% of all tornado deaths
- Lifetime can exceed 1 hour
- Lifetime can exceed 1 hour

Tornado Myths:

MYTH: Areas near rivers, lakes, and mountains are safe from tornadoes.
FACT: No place is safe from tornadoes. In the late 1980's, a tornado swept through Yellowstone National Park leaving a path of

destruction up and down a 10,000 ft. mountain.

MYTH: The low pressure with a tornado causes buildings to "explode" as the tornado passes overhead.
FACT: Violent winds and debris slamming into buildings cause most structural damage.

MYTH: Windows should be opened before a tornado approaches to equalize pressure and minimize damage.
FACT: Opening windows allows damaging winds to enter the structure. Leave the windows alone; instead, immediately go to a safe place.

Tornadoes Occur Anywhere

Carolinas Outbreak:

- March 28, 1984, afternoon-evening
- 22 tornadoes
- 57 deaths
- 1,248 injuries
- damage $200 million
- 37% of fatalities in mobile homes

Pennsylvania-Ohio Outbreak:

- May 31, 1985, late afternoon-evening
- 41 tornadoes, including 27 in PA and OH
- 75 deaths in U.S.
- 1,025 injuries
- damage $450 million

Plains Outbreak:

- April 26-27, 1991, afternoon of 26th through early morning 27th
- 54 tornadoes
- 21 deaths
- 308 injuries
- damage $277+ million
- 15 deaths in/near mobile homes, 2 deaths in vehicles

Weather Radar Watches the Sky

Meteorologists rely on weather radar to provide information on developing storms. The National Weather Service is strategically locating Doppler radars across the country which can detect air movement toward or away from the radar. Early detection of increasing rotation aloft within a thunderstorm can allow life-saving warnings to be issued before the tornado forms.

Doppler Radial Velocity

Jim Ladue

Frequency of Tornadoes

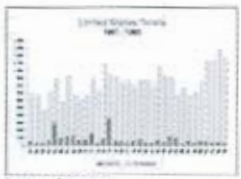
Tornadoes can occur at any time of the year.

- In the southern states, peak tornado occurrence is in March through May, while peak months in the northern states are during the summer.
- Note, in some states, a secondary tornado maximum occurs in the fall.
- Tornadoes are most likely to occur between 3 and 9 p.m. but have been known to occur at all hours of the day or night.
- The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. The average forward speed is 30 mph but may vary from nearly stationary to 70 mph.
- The total number of tornadoes is probably higher than indicated in the western states. Sparce population reduces the number reported.

Months of Peak Tornado Occurrence

larger image

United States Totals 1961-1993



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US Reported Tornadoes and Average Number of Deaths Per Year 1961-1993

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STAY INFORMED ABOUT THE STORM

by listening to NOAA Weather Radio, commercial radio, and television for the latest tornado WATCHES and WARNINGS.

When conditions are favorable for severe weather to develop, a severe thunderstorm or tornado WATCH is issued

Weather Service personnel use information from weather radar, spotters, and other sources to issue severe thunderstorm and tornado WARNINGS for areas where severe weather is imminent.

Severe thunderstorm warnings are passed to local radio and television stations and are broadcast over local NOAA Weather Radio stations serving the warned areas. These warnings are also relayed to local emergency management and public safety officials who can activate local warning systems to alert communities.

NOAA WEATHER RADIO IS THE BEST MEANS TO RECEIVE WARNINGS FROM THE NATIONAL WEATHER SERVICE

The National Weather Service continuously broadcasts updated weather warnings and forecasts that can be received by NOAA Weather Radios sold in many stores. The average range is 40 miles, depending on topography. Your National Weather Service recommends purchasing a radio that has both a battery backup and a tone-alert feature which automatically alerts you when a watch or warning is issued.

What To Listen For...

TORNADO WATCH: Tornadoes are possible in your area. Remain alert for approaching storms.

TORNADO WARNING: A tornado has been sighted or indicated by weather radar. If a tornado warning is issued for your area and the sky becomes threatening, move to your pre-designated place of safety.

SEVERE THUNDERSTORM WATCH: Severe thunderstorms are possible in your area.

SEVERE THUNDERSTORM WARNING: Severe thunderstorms are occurring.

Remember, tornadoes occasionally develop in areas in which a severe thunderstorm watch or warning is in effect. Remain alert to signs of an approaching tornado and seek shelter if threatening conditions exist.

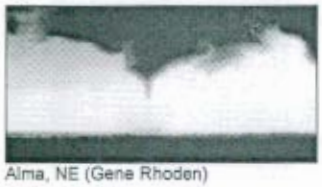
Environmental Clues

Look out for:

- Dark, often greenish sky
- Wall cloud
- Large hail
- Loud roar; similar to a freight train

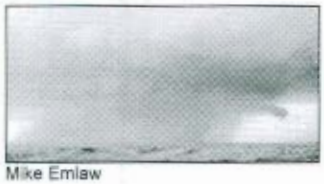
Caution:

- Some tornadoes appear as a visible funnel extending only partially to the ground. Look for signs of debris below the visible funnel.



Alma, NE (Gene Rhoden)

- Some tornadoes are clearly visible while others are obscured by rain or nearby low-hanging clouds.



Mike Emlaw

Other Thunderstorm Hazards

These dangers often accompany thunderstorms:

- Flash Floods: Number ONE weather killer - 146 deaths annually
- Lightning: Kills 75-100 people each year
- Damaging Straight-line Winds: Can reach 140 mph
- Large Hail: Can reach the size of a grapefruit - causes several hundred million dollars in damage annually to property and crops

Contact your local National Weather Service office, American Red Cross chapter, or Federal Emergency Management Agency office for a copy of the "Thunderstorms and Lightning...The Underrated Killers" brochure (NOAA PA 92053) and the "Flash Floods and Floods...The Awesome Power" brochure (NOAA PA 92050).

Center photo Bill Bunting

Tornado Safety
What YOU Can Do

Before the Storm:

- Develop a plan for you and your family for home, work, school and when outdoors.
- Have frequent drills.
- Know the county/parish in which you live, and keep a highway map nearby to follow storm movement from weather bulletins.
- Have a NOAA Weather Radio with a warning alarm tone and battery back-up to receive warnings.
- Listen to radio and television for information.
- If planning a trip outdoors, listen to the latest forecasts and take necessary action if threatening weather is possible.

If a Warning is issued or if threatening weather approaches:

- In a home or building, move to a pre-designated shelter, such as a basement.
- If an underground shelter is not available, move to an interior room or hallway on the lowest floor and get under a sturdy piece of furniture.
- Stay away from windows.
- Get out of automobiles.
- Do not try to outrun a tornado in your car; instead, leave it immediately.
- Mobile homes, even if tied down, offer little protection from tornadoes and should be abandoned.

Top: James Campbell; Bottom: Gene Rhoden

Occasionally, tornadoes develop so rapidly that advance warning is not possible. Remain alert for signs of an approaching tornado. Flying debris from tornadoes causes most deaths and injuries.

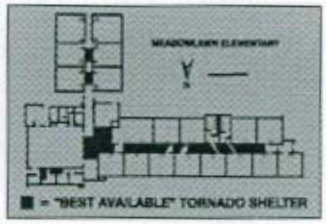
It's Up To YOU!

Each year, many people are killed or seriously injured by tornadoes despite advance warning. Some did not hear the warning while others received the warning but did not believe a tornado would actually affect them. The preparedness information in this brochure, combined with timely severe weather watches and warnings, could save your life in the event a tornado threatens your area. After you have received the warning or observed threatening skies, YOU must make the decision to seek shelter before the storm arrives. *It could be the most important decision you will ever make.*

Who's Most At Risk?

- People in automobiles
- The elderly, very young, and the physically or mentally impaired
- People in mobile homes
- People who may not understand the warning due to a language barrier

Tornado Safety in Schools
EVERY School Should Have A Plan!



- Develop a severe weather action plan and have frequent drills.
- Each school should be inspected and tornado shelter areas designated by a registered engineer or architect. Basements offer the best protection. Schools without basements should use interior rooms and hallways on the lowest floor and away from windows.
- Those responsible for activating the plan should monitor weather information from NOAA Weather Radio and local radio/television.
- If the school's alarm system relies on electricity, have a compressed air horn or megaphone to activate the alarm in case of power failure.
- Make special provisions for disabled students and those in portable classrooms.
- Make sure someone knows how to turn off electricity and gas in the event the school is damaged.
- Keep children at school beyond regular hours if threatening weather is expected. Children are safer at school than in a bus or car. Students should not be sent home early if severe weather is approaching.
- Lunches or assemblies in large rooms should be delayed if severe weather is anticipated. Gymnasiums, cafeterias, and auditoriums offer no protection from tornado-strength winds.
- Move students quickly into interior rooms or hallways on the lowest floor. Have them assume the tornado protection position (shown at right).

Hospitals, nursing homes, and other institutions should develop a similar plan

Your National Weather Service, Federal Emergency Management Agency, and American Red Cross educate community officials and the public concerning the dangers posed by tornadoes. YOU can prepare for the possibility of a tornado by learning the safest places to seek shelter when at home, work, school, or outdoors. You should also understand basic weather terms and danger signs related to tornadoes. Your chances of staying safe during a tornado are greater if you have a plan for you and your family, and practice the plan frequently.


Paul Bowen

FAMILY DISASTER PLAN

Families should be prepared for all hazards that affect their area. NOAA's National Weather Service, the Federal Emergency Management Agency, and the American Red Cross urge each family to develop a family disaster plan.

Where will your family be when disaster strikes? They could be anywhere - at work, at school, or in the car. How will you find each other? Will you know if your children are safe? Disasters may force you to evacuate your neighborhood or confine you to

your home. What would you do if basic services - water, gas, electricity or telephones - were cut off?

Follow these basic steps to develop a family disaster plan...

I. Gather information about hazards.

Contact your local National Weather Service office, emergency management or civil defense office, and American Red Cross chapter. Find out what type of disasters could occur and how you should respond. Learn your community's warning signals and evacuation plans.

II. Meet with your family to create a plan.

Discuss the information you have gathered. Pick two places to meet: a spot outside your home for an emergency, such as fire, and a place away from your neighborhood in case you can't return home. Choose an out-of-state friend as your "family check-in contact" for everyone to call if the family gets separated. Discuss what you would do if advised to evacuate.

III. Implement your plan

(1) Post emergency telephone numbers by phones; (2) Install safety features in your house, such as smoke detectors and fire extinguishers; (3) Inspect your home for potential hazards (such as items that can move, fall, break, or catch fire) and correct them; (4) Have your family learn basic safety measures, such as CPR and first aid; how to use a fire extinguisher; and how and when to turn off water, gas, and electricity in your home; (5) Teach children how and when to call 911 or your local Emergency Medical Services number; (6) Keep enough supplies in your home to meet your needs for at least three days. Assemble a disaster supplies kit with items you may need in case of an evacuation. Store these supplies in sturdy, easy-to-carry containers, such as backpacks or duffle bags. Keep important family documents in a waterproof container. Keep a smaller disaster supplies kit in the trunk of your car.

A DISASTER SUPPLIES KIT SHOULD INCLUDE:
A 3-day supply of water (one gallon per person per day) and food that won't spoil • one change of clothing and footwear per person • one blanket or sleeping bag per person • a first-aid kit, including prescription medicines • emergency tools, including a battery-powered NOAA Weather Radio and a portable radio, flashlight, and plenty of extra batteries • an extra set of car keys and a credit card or cash • special items for infant, elderly, or disabled family members.

IV. Practice and maintain your plan.

Ask questions to make sure your family remembers meeting places, phone numbers, and safety rules. Conduct drills. Test your smoke detectors monthly and change the batteries at least once a year. Test and recharge your fire extinguisher(s) according to manufacturer's instructions. Replace stored water and food every six months.

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