

MAST ACADEMY OUTREACH

MIDDLE SCHOOL PROGRAM

Adventures Aboard

WOW

(Weather on Wheels)

On-Site Highlights Packet



MAST Academy

Maritime and Science Technology High School

Miami-Dade County Public Schools

Miami, Florida

**MAST ACADEMY OUTREACH
WEATHER ON WHEELS
MIDDLE SCHOOL ON-SITE HIGHLIGHTS PACKET**

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The “thinking” symbol appears beside all critical thinking questions. Teamwork will be required to answer these questions.

WEATHER STATION 1

EVERY PICTURE TELLS A STORY

1. You will document your experience aboard Weather on Wheels by using the digital camera to take two photos of any of the Weather on Wheels stations and then writing about your photographs.
2. Look around and find something you want to photograph. If you are waiting to use the camera, you can look around, decide on what you want to photograph and start writing your story (see #3 below) before you take your photographs.
3. Write a story about each photograph. Use complete sentences in your story. Think about who or what is in your picture. If a person is in your photograph, what is he or she doing? If a computer is in your photograph, what is on the screen? If a piece of equipment or an instrument is in your photograph, what is it used for?

FIRST PHOTOGRAPH

This is a photograph of _____

SECOND PHOTOGRAPH

This is a photograph of _____

When finished, turn to page 2, the “Relative Humidity” Station.

WEATHER STATION 2 RELATIVE HUMIDITY

The amount of water vapor in the air is called humidity. Relative humidity is the amount of water vapor in the air at a certain temperature; warmer air can hold more water vapor than cold air. If the relative humidity is 50%, then the air is holding half the amount of water vapor it is capable of holding. If the relative humidity is 100%, then the air contains all the water vapor it can possibly hold.

It is easy to find relative humidity using the **hygrometer** on the table by reading the number at the end of the pointer.

1. What is the relative humidity reading on the hygrometer? _____ %

A **sling psychrometer** (Sigh-krom-a-ter) also measures relative humidity, but its use involves several steps. Follow the directions on the table for using the two sling psychrometers. Two people in your team should perform the activity at the same time and in the same manner, so that similar readings are obtained. Record both the wet and dry bulb temperatures and then follow the directions on the table to calculate the relative humidity.

Psychrometer	Dry Bulb Temperature	Wet Bulb Temperature	Relative Humidity
Student 1			
Student 2			

2. Find the average relative humidity (add the two relative humidities above, divide by 2) _____ %

3. Is the reading from the hygrometer (circle one) **higher than** **lower than** **the same as** the average relative humidity you calculated using the sling psychrometers?



Which instrument do you think may give you a less accurate reading? (Hint: Think about the number of steps you must follow to use each one.) (circle one) **hygrometer** **sling psychrometer**

Why? _____

1. Does today's relative humidity feel "comfortable" to you? **YES** **NO**

Why, or why not? _____



2. What does your body do to cool off when temperatures and humidities are higher than those in your "comfort zone?" _____



3. What does your body do to warm up when temperatures and humidities are lower than those in your "comfort zone?" _____

When finished, turn to page 3, the "Air Pressure" Station.

WEATHER STATION 3

AIR PRESSURE

Air (barometric) pressure is the force exerted by the weight of the air above us. This weight creates a force on you much like the weight or force on a diver at the bottom of the ocean. The **barometer** is an instrument that measures changes in air pressure.

Read the directions on the poster for reading the **aneroid** ("without liquid") **barometer**. Look at the aneroid barometer on the table, and answer question 1 below.

1. What is the current barometric pressure in millibars (mb)? _____

Hurricanes are areas of very low pressure (below 1000 mb). The lower the air pressure, the more intense the hurricane.

Look at the graph called "Air Pressure During Hurricane Katrina" and answer the following questions.

2. On what day was the air pressure the highest? _____
3. What was the air pressure on that day? _____
4. Hurricane Katrina hit New Orleans on August 29th. Was Katrina more or less intense the day before it hit New Orleans? (circle one) More Less

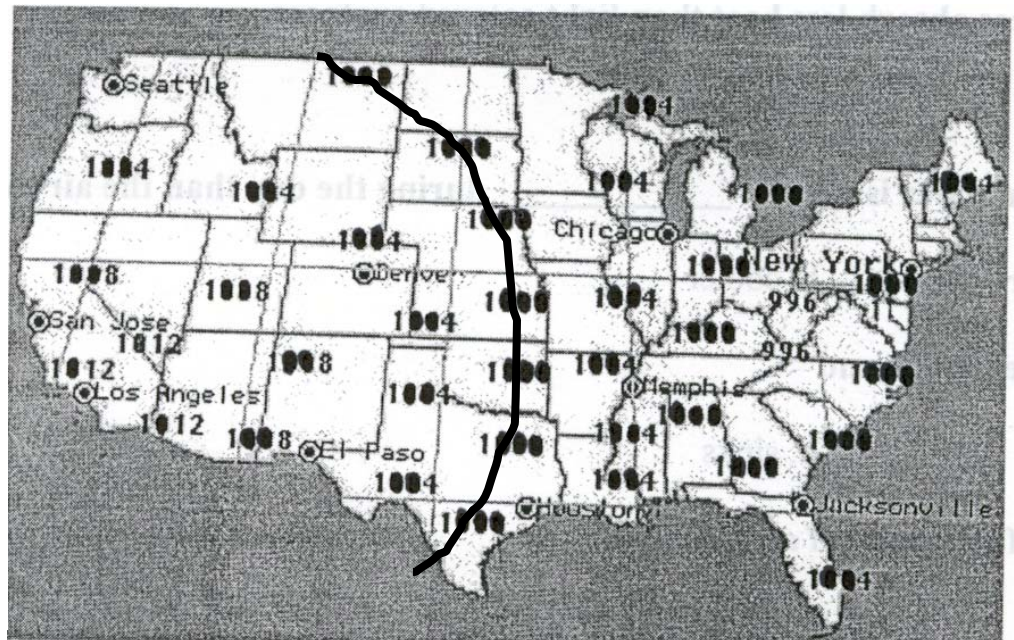
5. Explain your answer to #4. _____

6. If Katrina had hit New Orleans on August 28th, do you think it would have caused (circle one) more or less damage?

7. Explain your answer to #6. _____



Look at the *sample* weather map on the table. The thick black lines are called isobars. These lines connect locations of equal barometric pressure and form sets of curves that do not cross each other. On the map to the right (a *different map than the sample map*), use the yellow highlighters to draw in the isobars by connecting numbers of equal pressure. The first isobar is drawn for you.



Isobars can be used to identify "Highs" and "Lows". The pressure in a high is greater than the surrounding air and usually brings clear, sunny weather. The pressure in a low is lower than the surrounding air and usually means cloudy or rainy weather. On the map above, label with an "H" the center of a high pressure area, and label with an "L" the center of a low pressure area.

When finished, turn to page 4, the "Wind" Station.

WEATHER STATION 4

WIND

Wind is air in motion. It is caused by the unequal heating of the earth's land and water surfaces, which causes differences of pressure in the atmosphere. Follow the directions on the table for using the **TurboMeter** to record the wind speed in miles per hour.

1. **Wind Speed (MPH)** _____

A **hurricane** is a powerful tropical cyclone (rotating storm) with winds *over 74 miles per hour*. Using the hurricane plotting chart, follow the track of Hurricane Katrina in 2005. Record in the chart below Katrina's coordinates in latitude and longitude for each of the dates shown (a key to latitude and longitude is above the map).

DAT(11:00 PM)	LATITUDE	LONGITUDE
Aug. 23, 2005		
Aug. 24		
Aug. 25		
Aug. 26		
Aug. 27		
Aug. 28		
Aug. 29		

Hurricanes are classified according to both the intensity of the winds and the damage produced by the storm. The method used to measure the intensity and damage caused by a hurricane is called the Saffir-Simpson Scale which is shown below. This system categorizes storm intensity on a scale of one to five.

CATEGORY	CENTRAL PRESSURE		WINDS (MPH)	SURGE	DAMAGE
	Millibars	Inches			
5	<920	<27.17	>155	>18'	Catastrophic
4	944-920	27.88-27.17	131-155	13'-18"	Extreme
3	964-945	28.47-27.91	111-130	9'-12'	Extensive
2	979-965	28.91-28.50	96-110	6'-8'	Moderate
1	≥980	≥28.94	74-95	4'-5'	Minimal

2. What category hurricane has winds of 111-130 MPH? _____

3. What category has a central pressure of <920 millibars? _____

4. Hurricane Hugo in 1989 was a Category 4 hurricane. What type of damage did it cause? _____

5. Hurricane Andrew in 1992, Hurricane Camille in 1969 and the Florida Keys Hurricane of 1935 are the only Category 5 hurricanes to strike the United States. What was the storm surge? _____

When finished, turn to page 5, the "*Climate*" Station.

WEATHER STATION 5 CLIMATE

How does one distinguish weather from climate? One simple way to think of it is that climate is what we expect; weather is what we get. To describe climate, researchers look at the average weather over a number of years in a particular region during a particular season. In this activity, you will be comparing the subtropical climate in Miami to a desert climate in Phoenix, Arizona by using temperature, precipitation and relative humidity as your data.

1. Click on the book with the title “U.S. Climate Data.”
2. Click on the bar at the bottom right that says “List All Cities.”
3. Scroll down and click on **Miami, FL**. (Cities are listed alphabetically by state.)
4. Click on the bar that says “City Information.” There is a **yellow arrow** pointing to the month of January indicating that the information listed is for that month.
5. Record the **high temperature**, **precipitation (rain)** and **relative humidity** in the box for January in the data table below.
6. Click on March and record the data. Repeat for May, July, September, and November.

Miami	January	March	May	July	September	November
High Temperature						
Precipitation (rain) in Miami (inches)						
Relative Humidity (%)						

7. Click on the small square above the word “Miami.”
8. Scroll up to Phoenix, AZ and click on this city. Click on “City Information.”
9. Find and record the temperature, precipitation (rain) and relative humidity for each month.

Phoenix	January	March	May	July	September	November
High Temperature						
Precipitation (rain) in Phoenix (inches)						
Relative Humidity (%)						

Using the data above, answer the following questions.

1. What city has the highest temperature for any month? (circle one) MIAMI PHOENIX
2. What city has the highest rainfall for any month? (circle one) MIAMI PHOENIX
3. What city has the highest humidity for any month? (circle one) MIAMI PHOENIX
4. Describe the climate in Miami? (circle all that apply) HOT RAINY HUMID DRY
5. Describe the climate in Phoenix? (circle all that apply) HOT RAINY HUMID DRY



6. How would your use of water be affected if the climate in Miami changed to that of Phoenix? _____

Click on the “Home” button to return to the main screen.

When finished, turn to page 6, the “Weather Monitor” Station.

WEATHER STATION 6 THE WEATHER MONITOR

The “Weather Monitor” collects information about the weather from the **Weather Station** set up outside. Using the poster on the wall to help you find the information on the computer screen, fill in the data table below.

Time	Date	Moon Phase (Circle one)	 <small>New Moon First Quarter Full Moon Last Quarter New Moon</small>		
Outside Temperature °F	Inside Temperature °F	Outside Humidity %	Inside Humidity %		
Dew Point °F		Heat Index °F		 Wind Direction (use an arrow)	
Wind Chill °F	Wind Speed mph				
CURRENT Rainfall Day in	CURRENT Rain Rate in	Barometer mb			
Sunrise _____ AM Sunset _____ PM	Forecast (Circle one)				

At the top of the screen, click on the 5th icon from the left. (The icon with 2 small graphs.) If the graph is not showing the current time on the horizontal axis, then click on the arrow at the bottom right of the scroll bar to move the graph to the current time. One click moves the graph forward one hour.

1. What does the red line represent? _____
2. What does the blue line represent? _____

Read the following paragraph before answering questions 3 – 6.

Dew point is the temperature at which the atmosphere becomes 100% saturated (filled) with water. **If the outside temperature falls to the dew point temperature, water vapor in the air will condense, and dew will form on the windows or grass.** The dew evaporates once the outside temperature rises above the dew point.

3. On the graph shown on the computer screen, the outside temperature is higher than the dewpoint temperature. Under these conditions, would dew be able to form?
 _____ Yes _____ No

4. Why or why not? _____

5. If both the dew point and the outside temperature were the same, what would happen to the water vapor in the air?

6. If there was dew on the bus window early this morning but it is now gone, what happened to it? _____

At the top of the screen, click on the 3rd icon from the left to go back to the first screen.

When finished, turn to page 1, the “Every Picture Tells a Story” Station.

The School Board of Miami-Dade County, Florida, adheres to a policy of nondiscrimination in employment and educational programs/activities and strives affirmatively to provide equal opportunity for all as required by:

Title VI of the Civil Rights Act of 1964 - prohibits discrimination on the basis of race, color, religion, or national origin.

Title VII of the Civil Rights Act of 1964, as amended - prohibits discrimination in employment on the basis of race, color, religion, gender, or national origin.

Title IX of the Education Amendments of 1972 - prohibits discrimination on the basis of gender.

Age Discrimination in Employment Act of 1967 (ADEA), as amended - prohibits discrimination on the basis of age with respect to individuals who are at least 40.

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Veterans are provided re-employment rights in accordance with P.L. 93-508 (Federal Law) and Section 295.07 (Florida Statutes), which stipulate categorical preferences for employment.

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