

# **MAST ACADEMY OUTREACH**

## **ELEMENTARY SCHOOL PROGRAM**

### **Adventures Aboard**

### **WOW**

**(Weather on Wheels)**

### **On-Site Packet**



**MAST Academy**

**Maritime and Science Technology High School**

**Miami-Dade County Public Schools**

**Miami, Florida**

**MAST ACADEMY OUTREACH  
WEATHER ON WHEELS  
ELEMENTARY ON-SITE PACKET**

**TABLE OF CONTENTS**

<b>Station 1: Weather Media Center</b>	<b>1</b>
<b>Station 2: Relative Humidity</b>	<b>2</b>
<b>Station 3: Wind</b>	<b>3</b>
<b>Station 4: Clouds and Precipitation</b>	<b>4</b>
<b>Station 5: Air Pressure</b>	<b>5</b>
<b>Station 6: Every Picture Tells a Story</b>	<b>6</b>
<b>Station 7: Rain or Shine</b>	<b>7</b>
<b>Station 8: The Weather Monitor</b>	<b>8</b>
<b>Station 9: Climate</b>	<b>9</b>
<b>Station 10: Weather Wizards</b>	<b>10</b>

**Key to Symbols:**



The “umbrella” symbol appears beside all directions, which are always enclosed within a cloud.  
**READ ALL DIRECTIONS CAREFULLY.**



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

# WEATHER STATION 1 WEATHER MEDIA CENTER

At this station you will learn about weather forecasting by making observations from the newspaper's weather report and by listening to a NOAA weather radio.



Using the **FIVE DAY FORECAST** at the top of today's newspaper weather map that is on the table, find the information to complete the table below.

Three Day Forecast for Miami	Today	Tomorrow	Day after Tomorrow
Sky condition (sunny, cloudy, etc)			
HIGH temperature			
LOW temperature			
Wind direction			
Wind speed			



Look at the map of the United States, then answer question 1.



Find the **SUNBURN ADVISORY**, then answer question 2

1. Are there any fronts in Florida? YES NO  
If yes, what kind? (circle one)

2. What is the maximum safe exposure for a high level risk person? \_\_\_\_\_

WARM COLD STATIONARY



Find the **MARINE OUTLOOK**, then answer questions 3 and 4.

3. In Miami Harbor, when is the next high tide? \_\_\_\_\_ Next low tide? \_\_\_\_\_

4. Who would find the marine outlook important? \_\_\_\_\_



Turn on the radio and listen for a few minutes to become familiar with what is being broadcast. In the table below, place a check next to any weather and or marine forecast terms you hear on the radio. Turn off the radio when finished.

Terms	Check	Terms	Check
temperature		seas	
humidity		bays and inland water	
pressure		precipitation	
winds		forecast	
lightning		ultraviolet index	
clouds		rain	
chance of thunderstorms		moderate chop	
sky condition		barometer	
sunrise		showers	
sunset		mostly sunny	
high tide		tropical storm	
low tide		hurricane	

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. You will measure relative humidity using a **hygrometer** and a **sling psychrometer** (Sigh-krom-a-ter).



Look at the **hygrometer** on the table, then answer question 1.

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



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. Record both the wet and dry bulb temperatures in the table below.

Psychrometer	Dry Bulb Temperature	Wet Bulb Temperature
# 1		
# 2		



Use the **relative humidity table** to find the relative humidity for each sling psychrometer. Follow the directions to the left of the table. Record both relative humidities in the chart below.

Relative Humidity from Sling Psychrometer 1	
Relative Humidity from Sling Psychrometer 2	



Now find the average relative humidity, then answer questions 2 and 3.

Find the sum of the two numbers above (add them together).	
Divide this sum by 2. This is the average humidity.	

2. 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?

3. Which instrument do you think gives you the more accurate reading? \_\_\_\_\_  
Why? \_\_\_\_\_



When finished, turn to page 3, the “Wind” Station.

## WEATHER STATION 3 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 wind speed indicator 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 tracking map** on the table, 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).

DATE (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.

Use the Saffir-Simpson scale to answer the questions below.

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 4, the "Clouds and Precipitation" Station.

## WEATHER STATION 4 CLOUDS AND PRECIPITATION

At this station, we will learn about different types of clouds and record the cloud types present in the sky today, as well as record whether there has been any precipitation (rain).



Observe the sky in all directions as well as overhead. Using the **CLOUD CHART** on the table, decide what kind of clouds you see. Write the cloud type on the line provided. Draw the clouds you see in the box below. If there are no clouds, write "no clouds" for today's cloud type, and go on to question 1.

**TODAY'S CLOUD TYPE**

\_\_\_\_\_

1. What is the current **CLOUD COVER**? (circle one)

**CLEAR      PARTLY CLOUDY      MOSTLY CLOUDY      OVERCAST**



Some types of clouds are associated with rain while other types are considered "fair-weather" (sunny weather) clouds. Look at the **CLOUD CHART** on the table.

2. Name a fair weather cloud. \_\_\_\_\_

3. Name a rainy weather cloud. \_\_\_\_\_

4. Do **TODAY'S** clouds mean the weather will be fair or rainy? (circle one)    **FAIR**                      **RAINY**



Look at the **WATER CYCLE diagram** and answer the following questions.

5. Name two ways water is returned from the land to the air. \_\_\_\_\_

\_\_\_\_\_

6. Name two places where **RUNOFF** goes after returning to the earth as rain. \_\_\_\_\_

\_\_\_\_\_



Near this table is a **RAIN GAUGE**. Go to the Rain Gauge and record the amount of rain it contains below.

7. According to the rain gauge, how much rain has fallen today? \_\_\_\_\_ inches.

8. Based on your answer to Question 4, did you expect rain today?    **YES**                      **NO**

When finished, turn to page 5, the "Air Pressure" Station.

## WEATHER STATION 5 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.



Look for the **aneroid barometer** on the table. Read the directions under the picture of the **aneroid barometer** and answer question 1 below.

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



Look at the graph called “**Air Pressure During Hurricane Katrina**” and answer the following questions.

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

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 29<sup>th</sup>. Was Katrina more or less intense the day before it hit New Orleans? (circle one)    More    Less



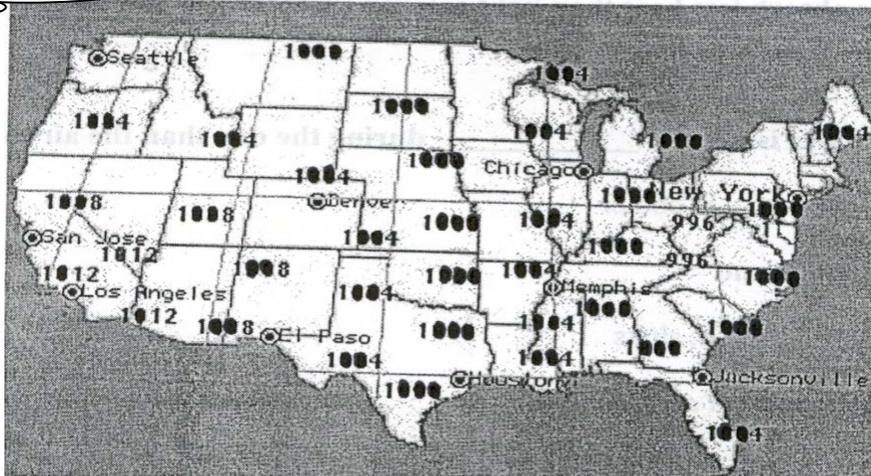
5. Explain your answer to #4. \_\_\_\_\_

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. \_\_\_\_\_

The map on the table is a sample of an air pressure map. 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 below, use the yellow highlighters provided to draw in the isobars by connecting numbers of equal pressure.



When finished, turn to page 6, the “**Every Picture Tells a Story**” Station.

**WEATHER STATION 6**  
**EVERY PICTURE TELLS A STORY**

You will document your experience aboard Weather on Wheels by using the digital camera to take two photos of any of the Weather Stations.



*Look around and find one of the weather stations you want to photograph.*

*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 \_\_\_\_\_

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**SECOND PHOTOGRAPH**

This is a photograph of \_\_\_\_\_

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When finished, turn to page 7, the “**Rain or Shine**” Station.

**WEATHER STATION 7**  
**RAIN OR SHINE**



*Put on headphones. Click on scenes 10 – 18. Click on picture 18 in the lower right hand corner of the screen. While watching the DVD, answer the following questions.*

1. **Rather than heating the air directly, sunlight heats the ground first, and the ground then heats the air.**  
a. TRUE                      b. FALSE
2. **Dark surfaces absorb less heat than light colored surfaces.**  
a. TRUE                      b. FALSE
3. **The air over water is usually \_\_\_\_\_ during the day than the air over land.**  
a. warmer                      b. cooler
4. **Heated air expands and**  
a. rises                      b. sinks
5. **A large uniform body of air is called**  
a. a front                      b. an air mass                      c. a thunderstorm                      d. a tornado
6. **The boundary between 2 air masses is called a:**  
a. edge                      b. front                      c. thunderstorm                      d. line
7. **A cold front usually brings cool, dry weather, but sometimes causes:**  
a. hurricanes                      b. snow                      c. tornadoes
8. **Which moves faster?**  
a. a cold front                      b. a warm front
9. **What instruments do meteorologists use to predict the weather?**  
a. computers                      b. satellites                      c. weather balloons                      d. all of these



*Before moving to the next station, click on the “Menu” button.*

*When finished, turn to page 8, the “Weather Monitor” Station.*

## WEATHER STATION 8 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)			
Outside Temperature °C	Inside Temperature °C	Outside Humidity %	Inside Humidity %		
Dew Point °C		Heat Index °C			
Wind Chill °C		Wind Speed mph			
CURRENT Rainfall Day in	CURRENT Rain Rate in	Barometer mb			
Sunrise _____ AM	Sunset _____ PM	Forecast (Circle one)			
					Wind Direction (draw an arrow)



At the top of the screen, click on the 5<sup>th</sup> 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? \_\_\_\_\_

**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 3<sup>rd</sup> icon from the left to go back to the first screen.

When finished, turn to page 9, the “Climate” Station.

## WEATHER STATION 9 CLIMATE

What is 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 use monthly **precipitation** data to compare the subtropical climate in Miami to a desert climate in Phoenix, Arizona.



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 precipitation (rain) 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.

Month	January	March	May	July	September	November
Precipitation (rain) in Miami (inches)						



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 precipitation (rain) for each month.

Month	January	March	May	July	September	November
Precipitation (rain) in Phoenix (inches)						



Using the precipitation data above, answer the following questions.



1. What is the wettest month for Miami? \_\_\_\_\_ For Phoenix? \_\_\_\_\_

2. What is the driest SEASON (spring, summer, fall, winter) in Miami? \_\_\_\_\_ In Phoenix? \_\_\_\_\_

3. How would you describe the climate in Miami?            WET            DRY

4. How would you describe the climate in Phoenix?        WET            DRY



5. Pretend that Miami has the same climate as Phoenix? Would it rain (circle one) more? or less?

6. If Miami had the same climate as Phoenix, how would we need to change how we use water?  
\_\_\_\_\_



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

. When finished, turn to page 10, the “Weather Wizards” Station.

## WEATHER STATION 10 WEATHER WIZARDS

Weather Wizards contains experiments that ask you to make adjustments to the weather to solve a problem. You will use an “**atmosphere transmogrifier**” to solve a problem involving thunderstorms in the city of Sherman, Florida.

- 
- A. Put on headphones. To listen to a weather newscast, and read “Desired Conditions” for preventing a thunderstorm, click on the **Novice** button. Then, click on **Thunderstorms** from the Experiments List.
  - B. Read the Objective and First Challenge. Click on the answer you think is the best. If your response is correct, answer question 1 below. Then click on Continue to go to the next challenge. If incorrect, click on Continue to try again until you get the correct answer.
  - C. Do the same for the next two challenges. After answering question 3, **don’t click on the Continue button.** Instead, read the directions in **red** at the bottom of the screen. Click on the flashing **Level** button at the top right of the screen to show the weather map.

1. You can reduce the likelihood of lightning by  
a. reducing the humidity    b. increasing the wind    c. reducing the temperature    d. increasing the cloud cover
2. Thunderheads are  
a. cumulus clouds    b. cirrus clouds    c. stratus clouds    d. cumulonimbus clouds

Remember, after answering question 3 correctly, **don’t click on the Continue button.** Instead, click on the flashing **Level button** at the top right of the screen to show the advanced weather map.

3. Thunderstorms are usually associated with  
a. strong low pressure systems    b. weak low pressure systems    c. moderate high pressure systems

- 
- D. You are now an Advanced Weather Wizard! Your objective now is to change different weather factors to prevent a thunderstorm from hitting the city of Sherman. Use your answers from the questions above to decide how to make adjustments to the weather.
  - E. If you decide to remove the low pressure system, click on the yellow **LOW** button. If you decide to add a high pressure system, click on the green **HIGH** button. Click and drag the pressure system if you decide to move it to a new location.
  - F. If you decide to change the temperature, moisture (humidity), or strength of the pressure systems, slide the red buttons to the right (to increase) or left (to decrease.)
  - G. If you decide to change the cloud cover, click on one of the sky pictures.
  - H. After making all your desired adjustments, click on the **Engage** button (the **orange** button to the far right) to start the “atmosphere transmogrifier” to see if your objective has been achieved.

4. Was your objective achieved?    Yes    No    (If yes, click on **Continue** for the weather newscasters final report. If no, click on **Continue** to make adjustments until time runs out or you achieve your objective.)

- 
5. If a thunderstorm didn’t hit, explain why your adjustments worked. If a thunderstorm did hit, explain why?

(Hint: Use information from the weather newscasters’ final report.) \_\_\_\_\_

\_\_\_\_\_

When finished, turn to page 1, the “Weather Media Center” 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.

**The Equal Pay Act of 1963, as amended** - prohibits sex discrimination in payment of wages to women and men performing substantially equal work in the same establishment.

**Section 504 of the Rehabilitation Act of 1973** - prohibits discrimination against the disabled.

**Americans with Disabilities Act of 1990 (ADA)** - prohibits discrimination against individuals with disabilities in employment, public service, public accommodations, and telecommunications.

**The Family and Medical Leave Act of 1993 (FMLA)** - requires covered employers to provide up to 12 weeks of unpaid, job-protected leave to "eligible" employees for certain family and medical reasons.

**The Pregnancy Discrimination Act of 1978** - prohibits discrimination in employment on the basis of pregnancy, childbirth, or related medical conditions.

**Florida Educational Equity Act (FEEA)** - prohibits discrimination on the basis of race, gender, national origin, marital status, or handicap against a student or employee.

**Florida Civil Rights Act of 1992** - secures for all individuals within the state freedom from discrimination because of race, color, religion, sex, national origin, age, handicap, or marital status.

**School Board Rules 6Gx13- 4A-1.01, 6Gx13- 4A-1.32, and 6Gx13- 5D-1.10** - prohibit harassment and/or discrimination against a student or employee on the basis of gender, race, color, religion, ethnic or national origin, political beliefs, marital status, age, sexual orientation, social and family background, linguistic preference, pregnancy, or disability.

*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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