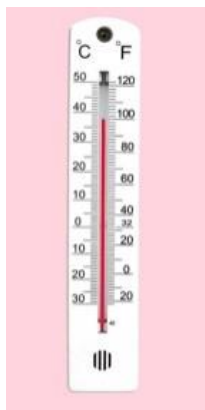


Supplement D – Weather Instruments Review

Weather: Background Information

Weather is defined as the conditions of the atmosphere in terms of heat, wind, pressure, and moisture. A description of the weather will usually include an aspect of at least three of these four elements. Weather is a measure of these conditions over a short time period (a day or two), whereas climate is a trend or average of conditions over many years.

Heat



Tool: Air Thermometer

Unit: In the U.S., we measure in degrees Fahrenheit (°F).

Directions: There are two units of measurement on the thermometer, Celsius and Fahrenheit. We will be measuring in Fahrenheit. To take the temperature, look at where the top of the red line is and read the corresponding number in degrees Fahrenheit. Numbers go by units of ten, and each smaller line represents 2 degrees.

Description: When temperature changes in different parts of the atmosphere, so does weather. The sun is the heat source for Earth and can be absorbed by surfaces (such as soil, water, or pavement) and by the atmosphere. The more dense the atmosphere is, the more heat that can disperse into the air. As with a rise in altitude, the atmosphere thins, dropping the temperature. Wind chill is also an indication of the temperature

brought about by wind speed. Higher winds make us lose heat quickly.

Liquid and Solid – Precipitation



Tool: Rain Gauge

Unit: Inches

Directions: Hold the rain gauge at eye level. Each line is worth a half an inch, with each whole inch marked on the rain gauge. Locate where the top of the water sits and read the line. For example, if the top of the water line sits at the line between one and two, there was one and a half inches of precipitation.

Description: Precipitation such as rain, snow, sleet, and hail can only occur if clouds are in the sky. However, not all clouds produce precipitation. Temperature and the presence of tiny particles or ice crystals determine whether precipitation will occur and which form it will take. Rain is formed when water molecules in the clouds collide and form bigger, heavier droplets. When the droplets become heavy enough, they fall as rain. Snow is formed as water condenses on small crystals of ice, which grow into snowflakes.

Wind – Wind Speed



Tool: Anemometer (wind speed)

Unit: Miles per hour (mph)

Directions: Have one student keep time and another count (if in groups of three, have the third student measure the wind direction). The student keeping time will set the timer for one minute. When the timer is started, the student counting will keep track of how many times the red cup spins past them. The student will stop counting rotations after one minute. Every ten rotations per minute are equal to one mile per hour. For example, if the red cup passes the counter 60 times in one minute, the wind speed is 6 miles per

hour.

Wind Direction



Tool: Wind Vane

Unit: Cardinal directions – North, South, East, West

Directions: There are four posts on the wind vane, each designating a direction. The top part of the vane will be moved by wind and indicates wind direction. To find the direction, look at which directional post the pointing side of the vane lines up with. If it lines up between two posts, combine the directions for a more specific wind reading (either NW, NE, SW, SE).

Description: The force of wind is created by differences in air pressure, friction, and rotation of the earth. If there were no wind, weather would

remain the same. Wind direction can help determine the weather forecast.

Atmospheric Pressure



Tool: Barometer

Unit: Inches

Directions: There are two sets of numbers on the face of the barometer. The outer circle measures in millibars of pressure, and the inner circle measures in inches. Students will measure in inches. Make sure the barometer is on a flat surface and that you are looking down directly at the face; use the large hand to read the pressure. For example, if the large hand is between the numbers 29 and 30 on the inner circle, and is resting at the small number 4, the barometric pressure is at 29.4 inches. Once you have taken the current

pressure, turn the black dial to line the small hand up with the large hand; this will mark the current pressure to compare to the pressure that will be taken later. Leave the barometer to sit. When you come back, you will be able to tell if the pressure has changed. If the two hands are still aligned, the pressure is the same. If the large hand has moved counterclockwise, the pressure trend is falling. If the large hand has moved clockwise, the pressure trend is rising. Disregard the “Rain, Change, Fair” on the face of the barometer.

Description: Atmospheric pressure, or air pressure, is the weight of the air pressing down on us. Because of gravity, there is more pressure at sea level than at the top of a mountain. Pressure changes so slowly from one place to another on the Earth’s surface that most people are not able to feel it. Wind is caused by air moving from an area of high pressure to an area of low pressure.

Moisture



Water Vapor - Humidity

Tool: Hygrometer

Unit: Percentage (%)

Directions: Keeping the hygrometer still and flat on the table, look directly over the face to find the point where the needle is resting.

Description: Humidity is the amount of water vapor in the air. Relative humidity is the amount of water vapor the air is holding expressed as a percentage of the amount that the air could hold at that particular

temperature. Warm air can hold more water than cold air. As the air cools below the saturation point, the water vapor in it condenses to form clouds.



Water Vapor – Clouds

Tool: Cloud Identification Chart


Directions: Point out the different types of clouds on the chart and explain what makes each of them different. Cumulus clouds are large, rounded, fluffy, clouds that look like cotton. Cumulus means heap or pile. Cirrus clouds are high, thin, wispy, and feathery. Cirrus means wisp of hair. Stratus clouds are

low, flat sheets of clouds that look like one huge cloud covering the whole sky. Stratus means layer. Nimbus means rain, so any type of cloud that has become dense with water and will form precipitation is called a nimbus cloud. Some clouds may fall under the category of more than one type of cloud. For example, *nimbostratus* clouds are dark grey clouds that form a layer across the sky and can potentially precipitate.

Description: Clouds are formed by warm air cooling beyond its saturation point and condensing into particles as tiny droplets. The aggregate droplets make up a cloud. Types of clouds are determined by size, color, and elevation. Fog is a low-lying cloud that forms when cool, moist air collects right above the land. Often, fog will collect in valleys, over lakes, or form when warm, moist air flows over cooler ground.



Supplement E – Data Collection Sheet

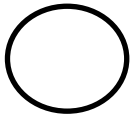
Arlington Echo

 Millersville, MD

_____ °F

Current conditions:

<p> Precipitation</p> <p>_____ in.</p>	<p>Wind</p> <p>_____ mph</p> <p style="text-align: center;"></p>
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Supplement F: Broadcast scenarios

Maryland
Year 2100



Maryland
Year 2100

You are broadcasting live from the future! Maryland's weather has changed since 2017 and the number of warm summer days has doubled! Instead of flying to Florida's beaches, people are spending their vacations in Ocean City! We have noticed a few more of those crazy summer thunderstorms too!

Your viewers want to know what the weather will be like in the future. Explain to your viewers how Maryland's temperature have changed.

Alaska
Year 2100



Alaska
Year 2100

You are broadcasting live from the only arctic region in the United States. Alaska has experienced a drastic increase in temperatures since 2017. The loss of glaciers and sea ice here have caused sea levels to rise!

Your viewers want to know what the weather will be like in the future. Explain how climate change affects

Florida
Year 2100



Florida
Year
2100

You are broadcasting live from the future. Florida is noticing the effects of climate change. Hurricanes have become much stronger than they were in 2017!

Your viewers want to know what the weather will be like in the future! Explain how climate change will affected storms.

Louisiana
Year 2100



Louisiana
Year 2100

You are broadcasting live from the future! Louisiana has lost many of their wetland habitats that used to protect them from flooding. Some of their highways are underwater! People may have to use boats instead of cars!

Your viewers want to know how weather will affect humans in the future. Explain how we may adapt to

Supplement F (continued)

Arizona

Year 2100



Arizona

Year 2100

You are broadcasting live from the future!
Arizona has been experiencing long periods of drought. It's been a while since we've had rain! This is one reason why we have experienced more wildfires.

Your viewers want to know what the weather will be like in the future. Explain how climate change affects the weather in dry climates.


Supplement G – Smart Board Instructions and Tips

Using the Smart Board and Camera

Arlington Echo staff will set up the computer each day for use. In case an Echo staff member is not available, here is a set of directions that could be helpful to using the technology.

1. Turn on both computers (cart computer and laptop).
2. Using the gray SmartBoard remote, turn on the SmartBoard. The power button is in the top corner of the remote.



3. Log onto the computers with the provided username and password. It will be sitting on or by the computer.
4. **On the laptop**, open a web browser by clicking on the google chrome icon  Then click on the corresponding YouTube videos on the bookmark bar.



5. Make sure the laptop is connected to the TV.
6. Turn the TV on select input and choose RGB.

To switch to the Document Camera:

7. On the document camera push the power button to turn on the machine. The silver power button is located on the side. It is already facing the direction it needs to be for the assignment.
8. Once it is on, hit the button on the top that says **PC/Camera**. It will switch the Smart Board from the computer screen to the “Weather Forecast Screen”.
9. Make sure the document camera is pointed at the TV. The document camera may be adjusted to the desired position.

Please turn off the Smart Board in between module rotations to save the light bulb! Thank you 😊