**Weather & Climate**

**Lesson #4: Water in the Air: Humidity and Precipitation**

**Essential Question:  How does weather affect our lives?**

**Standards:**

**3-ESS2-1**. Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area.

**3.MD.B.3**  Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how  many more” and “how many less” problems using information presented in bar graphs. (3-ESS2-1)

**Student will be able to:**

1.      Explain how humidity influences weather and how humidity readings can be used to make weather forecasts (predictions).

2.   Make predictions about levels of humidity, conduct experiments, and analyze the results.

3.   Use a bar graph about humidity in North Adams to answer questions and make predictions.

**Vocabulary:**

Humidity: a quantity representing the amount of water vapor in the atmosphere or a gas

Once students have a conceptual understanding of the vocabulary word they should create a 4-Square (Frayer Method from Key Vocabulary Routine) for the above word(s).

**Assessment:** Science notebook responses, participation in class activities and discussions, completion of the humidity experiments, bar graph worksheet ( to be completed by the classroom  teacher)

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| Science notebooks |  |
| Sponges | 8 |
| Pipettes | 20 |
| Plastic Plates | 8 |
| Thirsty Sponge Handouts | (make copies) |

**Activator:**We already know that there is some water in the air, but can air be “wet” when it is not raining?  What would that feel like?  How come sometimes it rains when it’s cloudy and sometimes it doesn’t?

**Introduction:**

**1.**      Introduce the concept of **humidity** with the class, and write humidity on the vocabulary wall.  Explain that humidity is the amount of water vapor or moisture in the air.  If the air is more humid, it has more water vapor.  If the air is less humid, it has less water vapor.  Discuss which seasons in North Adams are humid, with warm summers and no dry season.  Explain that warm air can hold more water vapor.  In the summer when it is hot, the air is more likely to be humid.  In the winter when it is cold the air is less likely to be humid (instead it is dry).  Ask students to think about where the water vapor in the air comes from.  Review the water cycle as necessary and explain that when the sun heats liquid water, the water evaporates into the air.

2.  You have read a passage with your teacher about how pollution in water can cause the climate to change. Remember that climate is the weather in a certain area over a long period of time.  One of the factors that affects climate is humidity. Certain places in the world are more humid than others.

**Activity:**

1.      Break the students up into groups and give each group a bowl of water, a plate with a sponge, and a pipette.

2.      Before the experiment, have the students squeeze the sponges to see that there is no water in them.  Ask the students how much water is in the sponge.  Have students make predictions in their science journals about what will happen when they add water to the sponge.

3.      Have students take turns taking pipettes of water and pouring them onto the  sponge. Have them record how many pipettes full  it takes until the sponge is “saturated” and stops holding water. Remind students to make and write down observations on how the sponge changes with the addition of water. Ask the students, what is happening to the water, and what will happen when you keep adding water.  [*Students may not understand what saturation is. You may demonstrate a visual of saturation by showing students a dry washcloth, and show them that it has no water in it.  Place the washcloth in the water long enough so that when you take it out of the water  it is dripping wet.  Allow the water to drip out and once it is not dripping, show the students that it is still holding water by wringing out the washcloth*.]

4.      Ask the different groups to share their predictions and results with the class and discuss the relation to humidity in the air and precipitation. For example, air can hold moisture without raining up to a certain amount, until there is too much moisture and it begins to rain.  Discuss that when it is really humid, there is a higher chance it will rain.

**Closure:**  Discuss the following questions with the class.  What is humidity?  Where does the water vapor in the air come from?  How does humid air feel?  How does dry air feel?

**Exit Ticket**:  If you were going to tell a kindergartener about humidity, what would you say?

*Teacher Note: After the Williams Students do the hands on lessons, teacher should complete the following activity.*

***1.***      *As a class read the background information about humidity  in North Adams. Use the information and bar graphs to answer the questions.*

Student Recording Sheet                                                                                                                       Lesson # 4

Thirsty Sponge: How Humid is Too Humid?

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| How much water did you add (pipettes)? | Is the sponge saturated?    (Yes or No) |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

How many pipettes full of water did it take to fill your sponge?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What happened to the sponge when it was saturated?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Read background information about humidity, use what you know about weather and humidity to answer the following questions.

What place do you think is more comfortable to live in July? Explain.

What place do you think is more comfortable to live in January? Explain.

**Humidity in North Adams, MA**

The relative humidity typically ranges from 35% (comfortable) to 98% (very humid) over the course of the year, rarely dropping below 19% (dry) and reaching as high as 100% (very humid).

The air is *driest* around April 20, at which time the relative humidity drops below 44% (comfortable) three days out of four; it is *most humid* around August 22, exceeding 96% (very humid) three days out of four.

**Humidity in Phoenix, AZ**

The relative humidity typically ranges from 9% (very dry) to 71% (humid) over the course of the year, dropping as low as 5% (very dry) and rarely exceeding 94% (very humid).

The air is *driest* around June 11, at which time the relative humidity drops below 11% (very dry) three days out of four; it is *most humid* around December 29, exceeding 57% (mildly humid) three days out of four.