

## **Storm Systems**

### **NATURE Summer Camp 2015**

#### **Project Description:**

In this lesson students will define and describe Storm Systems and their properties through discussion, demonstration, and experimentation. Students will cooperate with others during collaborative activities. Offer suggestions and opinions of investigative process and results. Form judgments about most reasonable solution to the problem. Communicate findings. This lesson consists of an analysis of blizzards, thunderstorms, tornadoes, hurricanes, and other catastrophic weather phenomenon and a discussion of their environmental impact and prediction.

#### **Project Objectives:**

To define and reflect on various storm systems and their relationship to climate

To determine conditions necessary for cloud formation

To learn the relationship between pressure and cloud formation

To learn the relationship between temperature and cloud formation

To identify and understand the properties of a tornado

To understand the dangers associated with a tornado

To know the rules and procedures to follow in the event of a tornado

To create a project relating what they have learned about tornadoes

#### **North Dakota State Science Standards:**

7.5.2. Explain how seasons affect organisms (e.g., hibernation, photoperiodism, migration)

8.5.1. Explain how factors (i.e., fronts, winds, air masses, air pressure, humidity, temperature, location) affect weather

8.5.3. Explain the water cycle

8.5.8. Explain how phenomena on Earth (i.e., day, year, seasons, lunar phases, eclipses, tides) are related to the position and motion of the Sun, Moon, and Earth

9-10.5.4. Identify the short-term and long-term effects of physical processes (e.g., plate tectonics, extreme weather phenomenon) on the environment and society

11-12.5.2. Explain how Earth systems are in dynamic equilibrium (e.g., cycling of energy and matter through the atmosphere, hydrosphere, and lithosphere)

**Session Organization:**

9:00am-9:30am	Cultural connection/brief introduction
9:30am-10:25am	Group Discussion/Pre-Knowledge Assessment
10:30am-11:00am	PowerPoint/Explanations of Activities
11:00am-11:50am	Group Discussion/Post-Knowledge Assessment
11:50am-12:00pm	12:00-12:45 Lunch
1:00-1:50	Activity I – Cloud in a Jar and Activity II- Rain in a Jar
1:50-2:30	Activity III- Tornado in a Jar
2:30-3:00	Wrap up

**Introduction:**

This unit is constructed for a High School general science class. This unit addresses the causes and effects of Storm Systems and investigates the relationship between types of weather and atmospheric conditions.

**Group Discussion/Assessment**

There will be two group discussions for assessment during the lesson, one for pre-assessment and for post-assessment. The class will be split into five groups. Each group will start at a designated table. Each table will have an instructor/mentor that will lead the discussions. On each table will be five large pieces (one for each group) of construction paper and colored markers that the students will use to doodle, take notes, or write down expressions of the topic. Students will be asked a general question at each table and will reflect using prior knowledge for the pre-assessment and new knowledge for the post-assessment. Each group will be given 5-7 minutes to talk about the topic at the table, once the time is up, the groups will then move to a different table and discussion will start again and so on until each group has visited every table.

Once the discussions are over the construction papers with the doodles and writings will be taped to the wall so comparisons of the pre-discussion to the post-discussion remarks can be compared.

The questions for table discussions is as follows:

Pre-Assessment Questions:

1. Have you ever been caught in bad weather? If so, what did you do?
2. Do you know any interesting myths or stories about weather?
3. Do you think that in recent years we are losing our four distinct seasons?
4. In your opinion, which season is the most beautiful? Which season is the most comfortable for you?
5. Do you think weather affects the way people feel?

Post-Assessment Questions:

1. What are the different kinds of weather?
2. What is the relationship between weather and natural disasters?
3. Why is it important to know future weather conditions in advanced?
4. Why are weather patterns important to the environment in which you live?
5. In your life time have you noticed a change in climate in your area? If you have noticed a change, what do you assume the reasoning is for the change?

### **Activity I:**

Make a Cloud in a Jar

The purpose of this experiment is to observe Cloud formation.

### **Materials**

Gallon jar or Mason Jar

Hot water

Matches

Ziplock size bag of ice

### **Procedure**

1. Heat your water until it is steaming (Hot plate, Microwave, Bunsen burner, etc.)
2. Fill one third of the jar with hot water.
3. Light the match and hold it over the jar opening.
4. After a few seconds, drop the match into the jar and cover the top of the jar with the bag of ice.
5. Record your observations.

### **Questions**

1. Can you see anything happening inside the jar?
2. You should see a little cloud form. Repeat the experiment until you do.  
Why does the cloud form?

*Possible Explanation:* The warm water heats the layer of air that it touches. Some of the water evaporates into the air forming water vapor. The warm air containing water vapor rises, and then cools, as it comes in contact with the air cooled by the ice. When the water molecules cool, they slow down and stick together more readily. The particles of smoke act as nuclei for “bunches” of water molecules to collect on. This process is called condensation.

3. What does this experiment have to do with weather?  
*Possible Explanation:* As the atmosphere (air) cools, water vapor suspended in the atmosphere condenses into water droplets around condensation nuclei (tiny particles of dust, ash, pollutants, and even sea salt).
4. Why are clouds white?
5. Why do clouds turn grey?

### **Activity II:**

Make it Rain in a Jar!

The purpose of this experiment is to observe how rain is formed.

## **Materials**

Glass Jar

Hot water

Plastic wrap, tape or large rubber band

Ice cubes

## **Directions**

1. Heat your water until it is steaming (Hot plate, Microwave, Bunsen burner, etc.)
2. Pour the hot water into a jar until it is about 1/3 filled. Put a plate on the top of the jar. Wait a minute or two before the next step.
3. Cover jar with plastic wrap and seal with tape or rubber band
4. Put the ice cubes on top of the plastic wrap and watch closely to see what happens inside the jar.
5. Streaks of water will run down the side of the jar, making rain!

## **Questions**

1. Record your observations here.
2. How is this experiment similar to clouds when it rains?

## **Activity III**

Tornado in a Jar!

## **Materials**

Mayonnaise jar or a canning jar

Clear liquid soap

Vinegar

Water

\*food coloring and/or glitter

## **Directions**

1. Fill the jar about three-quarters full of water.
2. Put a teaspoon of the liquid soap into the jar.
3. Also, add a teaspoon of vinegar into the jar.

4. Tighten the lid and shake the jar to mix up the ingredients.
5. Now, swirl the jar in a circular motion. The liquid will form a small tornado.

\*If you want to get creative, you can also use food coloring to make the tornado have a color and glitter to represent debris

### **Questions**

1. Explain what happened in the jar?
2. Write a paragraph summarizing conditions necessary for the formation of your tornado, comparing those to the conditions necessary for real tornado formation in the atmosphere.
3. In a real weather situation, what conditions cause tornado's to form? (Create a list of the steps, in order, that occur for a tornado to form).
4. What exactly is a tornado?
5. If there is one tornado, are there likely to be more?
6. Is a twister the same as a tornado?
7. Where do the most tornadoes occur?
8. How are tornadoes measured?
9. They say the sky turns green before a tornado. Is this true?

### **Wrap-Up & Discussion:**

1. How were the concepts of STEM used in today's activity?
2. What was the most successful idea you used in the activity?
3. What did you try in the activity that did not work?
4. Why do think it did not work?