

Environmental Education – First Grade  
October 2010

## WEATHER

**Total Time:** 45min

**Suggested Volunteers:** 3 or more

### **Activity Breakdown:**

**Whole Class Activity Intro:** Meteorology and You!

#### **Station 1:** Air Pressure in Action

**Activity 1:** Measuring Air Pressure

**Activity 2:** Cloud in a Bottle

#### **Station 2:** Wind and Water (outside in the Children's Garden)

**Activity 1:** Measuring Wind

**Activity 2:** Measuring Rainfall

#### **Station 3:** Temperature and Storms

**Activity 1:** Measuring Temperature

**Activity 2:** Tornado in a Bottle

**Activity 3:** Thunder Tube

### **Before the Activity:**

**1. Check the weather.** Take a minute to look at the temperature, pressure, wind strength and direction on the day of your activity so you can have an idea if the kids' measurements are in the ballpark.

**2. Decide if you'll be making wind sticks or a weather vanes.** Hopefully the weather will allow you to complete Station 2 in the garden so the kids can check the rain gauge and measure the wind. Remind the kids to observe their plants while they're there! So if you're outside, the wind sticks are quick, easy and good for picking up small breezes. But if it's raining and you can't get outside, you might consider using the kit to make weather vanes.

**Please Keep the Box Tidy!**

## Whole Class Activity Intro: Meteorology and You!

**Time:** Approx 5min

**Supplies Needed:**

Weather Charts – 1 per student

Thunder Tube and Pencil

Pencil for recording – provided by student

**Read to the Class:** *Hi Class! Today we're going to learn about the Weather. Why is it important to understand the weather? Just imagine you're a caveman walking along on a sunny day. You look up and notice some clouds forming in the sky but you don't know what it means. Suddenly a storm begins to rage and thunder booms (shake thunder tube) and lightning cracks (tap spring on thunder tube with a pencil) as you race to find shelter from the storm. Imagine how scary that must have been!*

*People have been studying the weather since ancient times because they learned that understanding the weather could make life a lot easier and a lot less scary. They studied the weather to help them decide what to wear or when to plant and harvest their crops so they could grow the most food. They studied the weather to help them know how much food they needed to store so they would have enough to eat for the whole winter. They studied the weather to know when they needed to move their camps to higher ground to keep them safe from flooding in the spring.*

*Now the study of weather has become a science called Meteorology. Scientists who study weather are called Meteorologists. You might have seen Meteorologists on TV predicting the weather. But there are lots of Meteorologists that you don't see on TV, like the ones working in the National Weather Service. These scientists measure and record the weather every day. They collect and study the data, or information, and use it to predict the weather and also to warn people if there is danger.*

*It's because of Meteorologists that we know if we need to seek shelter from severe weather. They issue warnings if there is a big storm or high winds. (shake thunder tube again) They turn on sirens if there is a tornado and tell people when to evacuate if there is a flood or hurricane. Meteorologists have a very important job and can even save lives! Today YOU are going to be Meteorologists by learning how to measure the weather.*

**Hand out Weather Charts.** *Each of you will get one of these Weather Charts and you'll need to get out your pencil to record, or write down the data that you collect. Please make sure to write your name on your chart and keep track of it as you go through all the stations today.*

**Divide the class into 3 groups.**

## Station 1: Air Pressure in Action

**Time:** Approx 15min

2 Grown-ups

**Materials:**

Barometer (weather station)

Safety Glasses

1 Liter Plastic Bottle

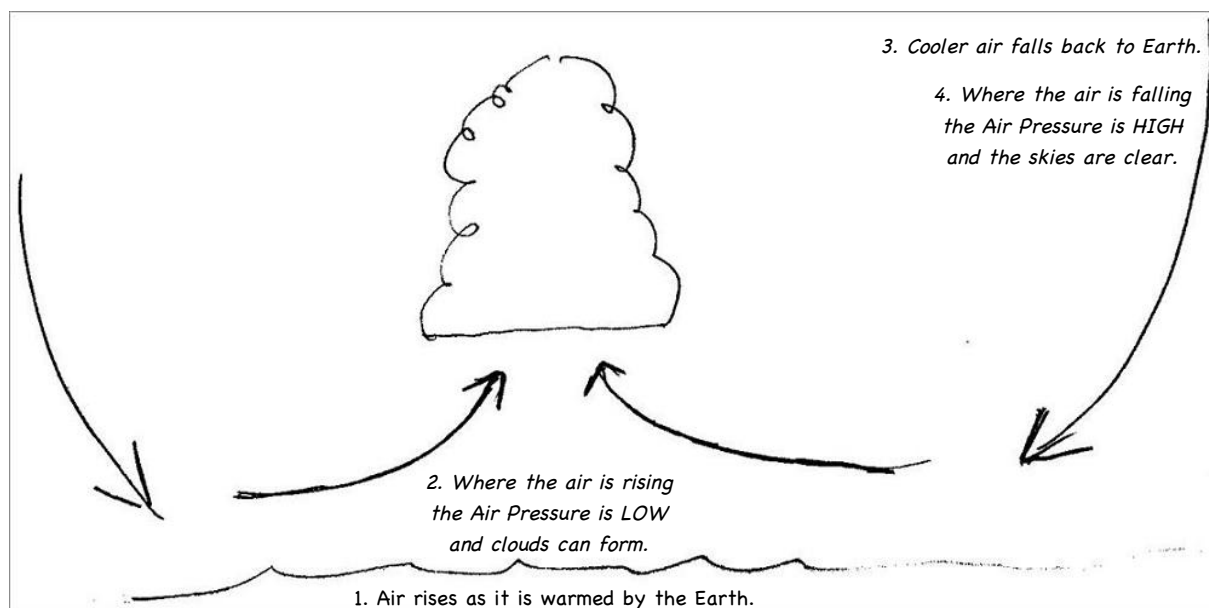
Rubbing Alcohol

Air Pump with Rubber Stopper

Water

### ACTIVITY 1 – Measuring Atmospheric Pressure

**What is Atmospheric or Air Pressure?** It's the pressure of the air in our atmosphere pressing down on us. You may not be able to feel it but the different gasses that make up our air have weight and they swirl around through our atmosphere as they are warmed by the Earth. In areas where the air is swirling down we have High Pressure. This keeps the water pressed into the air and we have clear skies. In areas where the air is swirling up we have Low Pressure. This lets the water droplets out to form clouds and rain and sometimes storms. Soon we'll do an experiment to see how this works.



**How do scientists measure Air Pressure?** Scientists measure Air Pressure using a Barometer. Let's check our Barometer and record the pressure on our Weather Chart. Would you expect the pressure to be High or Low? (Hint: is it sunny or cloudy outside?)

## ACTIVITY 2 - Cloud in a Bottle

1. Put on safety glasses and ask the kids to step back a little bit.
2. Add a small amount of water to the bottle and swirl to coat the sides.
3. Add a small amount of rubbing alcohol to the bottle and swirl again.
4. Verify that the rubber stopper is screwed tightly and locked to the pump hose. Press the rubber stopper firmly onto the top of the bottle. A good seal is essential for cloud formation.
5. With one grown-up holding the rubber stopper tightly onto the bottle (it will try to pop out) have the other grown-up use the pump to add air to the bottle - approx 8 pumps.
6. Prepare the kids for a loud popping noise and then quickly pull the rubber stopper out of the bottle. POW - It's a Cloud!!!
7. Replace the rubber stopper and add pressure again and like magic the cloud is gone.

**What happened?** *The high pressure in the bottle "pressed" the water into the air. When the pressure dropped the water was released from the air and was free to form a cloud of water vapor. This is the same thing that happens in our atmosphere when the air pressure is Low. And then when we increased the pressure in our bottle again, the water was pressed back into the air and the cloud disappeared.*

**Why is this important?** *Scientists can use air pressure to predict the weather. When the Barometer shows that the pressure is High they can expect clear skies. When the Barometer shows the pressure is Low then they know the conditions are right for storms.*

## Station 2: Wind and Water

**Time:** Approx 15min

**Materials:**

Rain Gauge (outside in the garden)

Straws – one per student

Crepe Paper – about 1 foot per student

Compass

Pre-made Weather Vanes

Optional Weather Vane Kit (Materials in separate box)

### ACTIVITY 1 – Measuring the Wind

**Why is it important for scientists to measure the wind?** Scientists measure the wind so they can predict how weather moves. By knowing the speed and direction of the wind they can guess where a storm is going and how quickly it will get there. It's also very important for people who pilot airplanes and ships to know how strong the wind is blowing and what direction it is coming from.

**How do scientists measure the wind?** Scientists measure the speed and direction of the wind with a special device called an anemometer. As the wind blows it spins the cups around. They spin faster as the wind blows harder to measure the speed of the wind. The flat plate acts like a weather vane and will always turn toward the wind to measure the direction of the wind. For example, if the plate is pointing toward the South, the wind is coming from the South and it's called a South Wind.



**Hand out Pre-Made Weather Vanes.** We can use our Weather Vanes to see how they will point toward the wind. Blow on the side of them and watch the arrow spin toward you. Hold them up and see if the wind will blow them. Use the Compass to chart the direction.

#### **Make a Wind Stick.**

1. Give each student 1 straw and approx 1 foot of crepe paper.
2. Attach crepe paper to end of straw with tape or by stuffing into the end of the straw.
3. Hold Wind Stick in the air and observe how the paper blows.
4. Use Compass to determine direction and record on Weather Chart.

## ACTIVITY 2 – Measuring Rainfall

**Why is it important for scientists to measure rainfall?** Scientists measure rainfall, or precipitation so they can determine how wet or dry the ground is. If it rains too much or too quickly there may be flooding and people may have to be moved to safety. If it doesn't rain enough there may be a drought and water restrictions will be issued. In some places, like in the Western United States, very dry and windy conditions can start dangerous wildfires.

**How do scientists measure rainfall?** Scientists measure rainfall with a rain gauge, just like us. They also use other tools, like satellites to measure rainfall over large areas.

### Read the Rain Gauge.

1. Have students observe the Rain Gauge in the garden.
2. Record the amount of rainfall on their Weather Chart.

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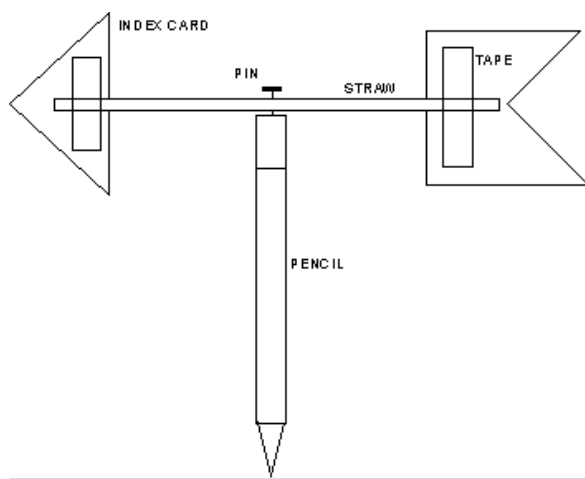
## OPTIONAL ACTIVITY – Making a Weather Vane

### Materials (in separate box):

Straws – one per student  
Index Card – one per student  
Tape

Pencil – one per student  
Push Pin – one per student  
Compass

1. Cut the point and tail of an arrow out of an index card. (You can save time having this pre-cut for the children)



2. Tape the point and the tail of the arrow to the ends of the straw.
3. Push the pin through the middle of the straw.
4. Stick the pin into the eraser of the pencil. Make the hole in the eraser large so the straw can turn freely.
5. When working properly, the weather vane will not spin like a windmill. Instead the arrow should point in the direction that the wind is coming from.

## Station 3: Temperature and Storms

**Time:** Approx 15min

**Materials:**

Thermometers – one per student  
Thunder Tube

2 Large Tornado Tubes  
Tornado Jars

### ACTIVITY 1 – Measuring Temperature

**How do scientists measure temperature?** Scientists measure temperature, or how hot or cold something is, with a thermometer. Today we're going to use thermometers to measure the temperature.

**Pass out the thermometers.** Temperature can be measured in different ways. In the United States we measure it in degrees Fahrenheit or °F. In other parts of the world they use the metric system and temperature is measured in degrees Celsius or °C. Look closely at your thermometer to see the two sets of numbers.

1. Have students place their thermometers on the desk and observe the temperature of the air in the room.
2. Record the data on their Weather Chart in both °F and °C.
3. Have the students gently hold the bulb of their thermometers in their hand and see what happens.

**Why is it important for scientists to measure the temperature?** Scientists measure the temperature of the air and water for a couple of reasons. By keeping track of the temperature over a long period of time, Meteorologists can better predict, or forecast, what the temperature is going to be in the future. For example, now anyone can look up what the average high temperature in Alpharetta, GA is during the month of October. Can you guess what it is? (72°F) What month do you think is the coldest? (January 50°F) Which one is the hottest? (July 88°F) We know these things because scientists have been measuring and recording data for many years.

Another reason Meteorologists measure the temperature is to predict severe weather. When air or water is warm it is more likely to produce storms. And when a warm, wet air mass runs into a cool, dry air mass – that's when you can get Tornados!

## ACTIVITY 2 - Tornado in a Bottle

1. Hold the Tornado Tube vertically.
2. Flip the entire thing to stand vertically on the empty bottle.
4. Swirl the bottles vigorously in a circular motion on a flat surface until a vortex forms. The vortex will increase as the water drains down. You can spin it either clockwise or counterclockwise.



## ACTIVITY 3 - Thunder Tube

1. Hold the Thunder Tube around the middle with one hand, spring hanging down.



2. Make the spring dance by shaking the Thunder Tube; shake it using your wrist only, not your entire arm.
3. Do not whip the spring around. It will not improve the sound.
4. Move the palm of your other hand on and off the opening of the Thunder Tube. Try it slow and fast. Listen to the sound quality change.
5. Another effect is to scrape a fingernail along the spring while holding the Thunder Tube still. This will make a scary creaking sound is like a door on an old closet full of family secrets. Try tapping the spring with a pencil to make lightning.

