

## **4. Storms**

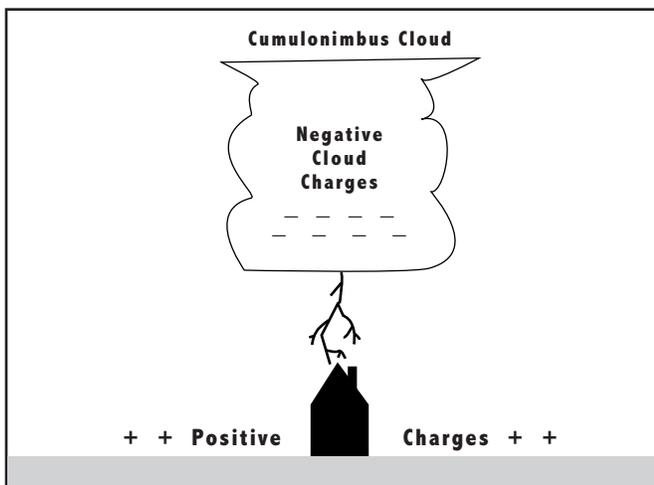
**OBJECTIVES:** After completing this lesson, a student should be able to:

- \* Discuss **SAFETY RULES** (See Appendix)
- \* Measure **PRECIPITATION AMOUNTS**
- \* Define **LIGHTNING, THUNDER** and **TORNADO**
- \* Describe a **HURRICANE** (Grades 4-8)

### **TEACHER BACKGROUND: (Grades 1-8)**

At any given moment there are about two-thousand thunderstorms rumbling across the surface of the earth. We know that rising air cools to form water droplets on tiny particles. Clouds form in a region of rising air. The first step in the development of a thunderstorm is a harmless cumulus cloud. If air continues to rise, the cumulus cloud continues to grow. As a major weather system approaches, it may force the air to rise even more, and the cumulus cloud grows even larger, becoming a thunderstorm with heavy rain, lightning and thunder. We know from lesson 2 that a **COLD CLOUD** contains both water droplets and ice crystals. Ice crystals that split apart produce a charge in the cloud. Charges are either negative or positive and opposite charges attract.

As shown above, if the cloud has negative charges and the surface has positive charges, an attraction occurs between the cloud and the tallest object on



the earth's surface. The build-up of charges eventually triggers **LIGHTNING**, a discharge of electricity built up within a storm. Lightning can be as hot as the surface of the sun! Lightning causes **THUNDER**, a sound wave created by the heating

and expansion of the air. In the United States, lightning kills about one hundred people every year and injures hundreds more. Most lightning victims are outdoors on golf courses, under tall trees or on metal machinery. It is much safer to be inside. (See Appendix for safety rules.)

A few intense thunderstorms begin to rotate and may produce a rotating funnel called a tornado. A **TORNADO** is a rapidly rotating column of air in touch with the ground. Wind within the tornado funnel can range from 160-480 km/hr (100-300 mph). The life of a tornado can range from as little as 10 minutes up to several hours. The states of Texas, Oklahoma, Kansas, Nebraska, Arkansas and Missouri are collectively known as "tornado alley" with more tornadoes than anywhere else in the world, mostly during the spring months.

### **Additional notes for grades 4-8:**

In the fall, meteorologists watch the oceans for a larger storm called a hurricane. The **HURRICANE** is a rotating storm that forms over warm water with wind of 120 km/hr (74 mph) or higher. An average hurricane (550 km or 340 miles in diameter) is much larger than a typical tornado (100-600 meters or 320-1920 ft). Intense hurricanes resemble the shape of a doughnut, with a nearly calm "eye" in the center of the cyclone. The eye can be 10 to 20 miles wide. Hurricanes rapidly lose their strength once they move from the warm waters on to drier land.

# Storm Activity

## GRADES 1-3

### INTRODUCTORY: *CLASS STORM*

What does a storm **SOUND** like? Tell your class to simulate sprinkles by gently snapping their fingers. Then increase the rate. (rain) Now slap your hands on your lap to make it sound like rain pouring on the roof. Increase the slapping to heavy rain. Add claps of thunder or a whistling wind. Slowly decrease the level of sound back to sprinkles.

### ADVANCED: *STATIC BALLOON*

Blow up a balloon and ask the class if they can think of a way to keep the balloon stuck to the classroom wall without tape. After discussion, rub the balloon on your sleeve. Hold the balloon to the wall and release. The balloon should stay there. Explain how friction created a charge on the balloon called *static electricity*, the same electrical build-up as in a storm.

## GRADES 4-8

### INTRODUCTORY: *JAR TORNADO*

Fill a tall glass (or clear plastic) jar with water, one teaspoon salt and one drop of liquid dish soap off of a toothpick. Optional food coloring makes the water more visible. Tighten the lid and hold in your left hand while vigorously rotating the jar with your right hand for several seconds. Stop to observe a pulsating funnel in the jar!

### ADVANCED: *COMB ELECTRICITY*

Rub a plastic comb with a silk cloth then plunge it into a bowl of dry puffed rice. Pull the comb out. The rice sticks to the comb and then pops off seconds later. What held the rice to the comb? Or, after rubbing your comb on your sleeve, hold it near a small but steady stream of water from a faucet. If the comb has enough static charge, the stream of water will be attracted toward the comb!

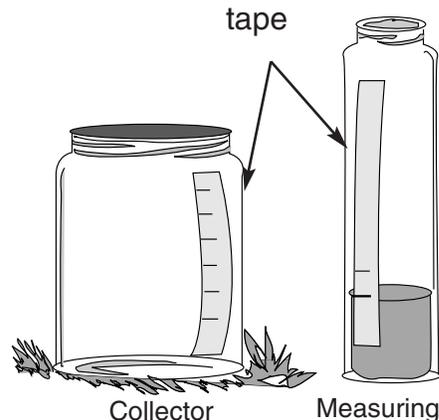
## BUILD A RAIN GAUGE (Time: 15-25 minutes) GRADES 1-8

**Materials:** A glass wide-mouth jar such as a mayonnaise jar (**COLLECTOR**), a glass olive jar 2.5 cm (1") across top (**MEASURING TUBE**), ruler, tape, felt-tip marker, rubber band (or string)

**Calibration:** Use the ruler to mark the tape in centimeters or half inches and place the tape on the **COLLECTOR** jar. Pour enough water into it to measure exactly 1 cm (1/2") on the tape, then pour that water into the **MEASURING TUBE**. Mark tape on the **MEASURING TUBE** representing equally spaced centimeter (or half inch) units from the bottom of the **MEASURING TUBE**. (The measuring tube provides a more precise method to read rainfall amounts.)

**Collection:** Place collector (level) in an open area outside on the ground or secure it to a post with the rubber band or string.

**Procedure:** After a rain, pour the water from the **COLLECTOR** into the **MEASURING TUBE**, counting the units of rainfall.



### **WEATHERSCHOOL QUESTION:**

**Which city receives the most thunderstorms? A. Denver, CO B. Topeka, KS C. Tampa, FL**  
**Obtain the answer tonight on your Weatherschool television channel!**