

Acid Rain, Go Away

Dear Presenter,

This is a 20 to 25 minute presentation and HANDS-ON activity for approximately 24 ten year-old children. You **MUST** do this activity at home **BEFORE** you attempt to lead the activity during the Water Festival. You may want to line up a volunteer helper for this activity.

As each new group of students arrive, find the classroom teacher, introduce yourself, and let the teacher know this is a hands-on activity and you will need assistance from him/her. If you do not ask for assistance, the teacher will assume that **YOU** are the **EXPERT** and they are the observer! Plan when you will ask the teacher for assistance! **DO NOT** hesitate to call the teacher by name and politely ask for their assistance with **ANY** of your needs.

As each session begins, introduce yourself and your volunteer helper to the students. "Good morning, my name is.... and I work for..., I am a or simply I am happy to be here today." Then introduce the topic of this presentation. Each step of this presentation is explained in this packet. These are recommended guidelines and do not have to be followed exactly word for word. However, you may present this material just as written. Feel free to personalize the presentation to suit you.

Thank you for volunteering to present "Acid Rain, Go Away." Have fun, enjoy yourself, and we hope you will consider volunteering again next year.

Big Sioux Water Festival

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BACKGROUND

Background information is provided as a basic overview with both general and specific information. Share this information with the students throughout the presentation.

The water cycle helps renew water as a pure resource. But the flow and cycling of water can also help spread pollution.

Acid rain is a prime example. Air pollution from industrial sources and automobiles releases sulphur oxides and nitrogen oxides into the air. When mixed with water vapor, they form sulfuric and nitric acids, which fall to the ground in the form of acid rain, snow, fog, or dew. Acid rain can cause damage to buildings, car finishes, crops, and forests. The major sources of acid rain are automobiles and coal-fired boilers at power plants and industries.

This acid precipitation can also pollute clean waterways through runoff. Increased acidity of water can negatively affect fish and other aquatic life. The effects of acid precipitation may not be felt for many months. Acidic snowmelt may create acid "shock" in a stream and cause a serious fish kill in the spring.

Acid particles are also deposited on to building and statues, causing corrosion. For example, the Capitol building in Ottawa has been disintegrating because of excess sulphur dioxide in the atmosphere. Limestone and marble turn into a crumbling substance called "gypsum" upon contact with the acid, which explains the corrosion of buildings and statues. In addition, bridges are corroding at a faster rate, and the railway industry as well as the airplane industry have to expend more money in repairing the corrosive damage done by acid rain. Not only is this an economically taxing problem caused by acid rain, but also a safety hazard to the general public; as an illustration, in 1967, a bridge over the Ohio River collapsed killing 46 people - the reason? Corrosion due to acid rain.

The most cost-effective (and the only reliable) solution to the problem of acid rain is to control the offending pollutants at their source. The goal must be to emit fewer pollutants into the air so that fewer acids form in the atmosphere. Today, power plants and industries emit a small fraction of what they did just a few short years ago. As pollution control technologies improve, and as society's commitment to environmental quality grows, we will emit even fewer acid-forming pollutants.

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MATERIALS LIST

(For 6 presentations with approximately 24 students)

CONSUMABLES

- 3 gallons of white vinegar
- 80 pieces of chalk (small segments work best)
- Student handouts - The Acid Rain Game & Activity Book
- Water
- Tak for poster

NON-CONSUMABLES

- 30 - 4 oz. clear plastic cups
- 5 gallon bucket
- Rags and towel
- The Tale of Lucy Lake story boards (set of 12)
- Easel for story boards
- Presenter instructions, cue cards and folder
- Acid Rain Poster

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ROOM REQUIREMENT

Room with or close to a water source

PRE-PREPARATION

- Check supplies against supply list
- Make 150 copies of student handout -The Acid Rain game & Activity book
- Break chalk into small pieces about 1/2" long.
- Read through the story cards to familiarize yourself with The Tale of Lucy Lake story. Rehearse the story (add voice characterizations).

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PREPARATION: Approximately 30 minutes to set up

- Count out 2 sets of 12 plastic cups - you will be using one set per session, rotating sets so that your volunteer helper can rinse out the used set while you're using the clean set (this will help eliminate the vinegar smell in the classroom).

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THIS A 20-25 MINUTE PRESENTATION
(Procedure note cards for this presentation are included)

To best explain and supervise this activity, ONE MUST DO THIS ACTIVITY before the actual presentation

INTENDED STUDENT OUTCOMES

By completing this activity students should be able to :

- To identify and demonstrate the effects of acid rain on buildings and statues
- To identify acid rain as a destructive weather occurrence
- To understand that acid rain affects all the environment

PROCEDURE

1. Introductions
2. Tell students that you are going to be talking with them about acid rain and the problems that happen in our environment with pollutants. Explain that acid rain is a weather occurrence that happens all over the world.
3. Acid rain is caused by fossil fuels, power plants, and cars & trucks. Show them the Acid Rain poster to show one example of how acid rain forms.
4. Acid rain affects all the environment. Give them a couple examples of acid rain degradation of buildings, bridges and statues. Then allow students to give you other suggestions of things that could be affected by acid rain. When a student suggests a lake or trees, tell them that you are going to tell them the story of Lucy Lake and then do an experiment.
5. Take the students through The Tale of Lucy Lake, using the story boards. After reading the story the students should know what acid rain is, what causes it, what it affects, and how each person can help prevent acid rain.
6. Tell the students they will now do a quick experiment to demonstrate acid rain. Divide the class into teams of 2 students per team. Hand out one plastic cup to each team. You or your volunteer helper walk around the classroom and fill each plastic cup 1/4 full of vinegar.
7. Give each team a piece of chalk to add to their cup. Explain that they are going to be making “pretend” acid rain with the vinegar. The chalk represents a building or a statue. Have student add chalk to cup of vinegar.
8. Bubbles should start rising from the chalk. Small pieces start to break off, and finally the chalk totally breaks apart.

9. Vinegar is an acid and acids slowly reacts chemically with the chalk. The piece of chalk is made of limestone, a mineral that quickly changes into new substances when touched by acid. One of the new substances is the gas seen rising in the vinegar, which is carbon dioxide gas. Acid affects all minerals, but the change is usually slow. The slow deterioration of statues and building fronts is due to the weak acid rain that falls on them. If the stone is limestone or has limestone in it, the deterioration is more rapid.
10. When acid rain falls from the sky, it affects the land or lake it falls on. The worse the problem, and the longer it goes on, the greater the effect. Over long periods of time, a lake's water can collect acid and other chemicals (e.g., metals that acid rainfall leaches out of soil around the lake) that are harmful to the living things in the water. If the problem becomes severe enough, the smallest animals and plants will die first; the larger animals will die. Finally, nothing will be alive in the lake.

SET UP FOR NEXT SESSION

- Have students empty their chalk and vinegar into the 5 gallon bucket or sink.
- Have volunteer helper collect the cups and start rinsing them out.
- Give students a copy of "The Acid Rain game" & Activity Book handouts
- Thank everyone for participating, compliment behavior and answer any questions the children may still have

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FINAL CLEAN UP AFTER LAST SESSION (Approximately 30 minutes)

- Rinse all cups out thoroughly. Let dry completely
- Place any unused chalk pieces back into chalk storage container
- Re-seal any unused vinegar and place in storage container
- Empty the used vinegar into the sink and rinse the bucket. Dry completely.
- Return all unused copies of “The Acid Rain game” to storage container
- Return story boards to their carrying case.
- Roll up the poster.
- Return all instructions, story cards and cue cards to presenter folder
- Place items into large storage container