Name _____ Class _____ Date _____

Observing the Effects of Acid Rain

Acid rain is formed when the combustion of fossil fuels releases gases containing nitrogen and sulfur compounds into the atmosphere. It can damage crops, forests, soil, and buildings. In this investigation, you will design and perform an experiment to simulate and test the effects of acid rain on the germination of seeds.

Problem

How does acid rain affect the germination of seeds?

Materials

- diluted sulfuric acid
- filter paper
- glass-marking pencil
- 2 petri dishes
- 100-mL graduated cylinder
- 100 seeds (mustard or radish)
- pH papers
- 2 100-mL beakers
- hand lens

Skills Designing Experiments, Controlling Variables

Design Your Experiment

1. **Formulating Hypotheses** Use your knowledge of acid rain to develop a hypothesis about its effect on plant growth and development. Record your hypothesis on the lines below.

   Hypothesis: _____

2. **Predicting** Record a prediction about how acid rain will affect seed germination. Write your prediction on the lines below.

   Prediction: _____

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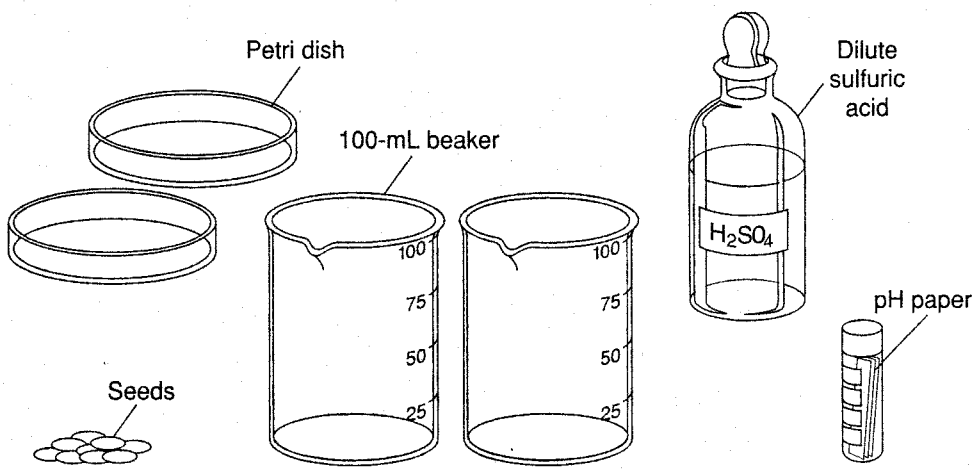
3. On the lines below, design and record an experiment to test your prediction. It is not practical in the classroom to expose some plants to acid rain and others to rain without acid. You will need to choose a way to simulate acid rain.



Experimental Plan: _____

4. As you plan your investigative procedures, refer to the Lab Tips box on page 55 of your textbook for information on demonstrating safe practices, making wise choices in the use of materials, and selecting equipment and technology. With your teacher's guidance, select the equipment and technology to use to measure pH: either pH paper or a pH probe. If using a pH probe, see your teacher for instructions.

5. Check your experimental design to make sure you are testing only one variable and have included any necessary controls. Construct any data tables you will need to use for recording the results of your experiment. With your teacher's approval, carry out your experiment. Use the data table on the next page, or construct one that will better suit your experiment. **CAUTION:** *Wear goggles, an apron, and plastic gloves when handling diluted sulfuric acid.* Wash your hands thoroughly with soap and warm water before leaving the lab.

Data Table		
Observations		
Date	**Control Seeds**	**Acid-Treated Seeds**

Analyze and Conclude

1. **Analyzing Data** What percentage of your control seeds germinated? What percentage of your acid-treated seeds germinated?

2. **Drawing Conclusions** What do your results imply about the short-term effects of acid rain?