

## Details



**Completion Time:** Less than a week

**Permission:** Download and Share

## Soil Study

### Overview

Students will conduct a soil study by investigating pH and water absorption.

### Objectives

Students will learn:

- How to describe the composition of soil and explain how it forms.
- That soil is made up of tiny particles of rock, plant, and animal matter.
- How to determine whether a solution is acidic, basic, or neutral.
- How scientists classify soils.
- That erosion is controlled by how well the soil retains water.

### Lesson Preparation

*Procedure for pH probeware*

1. Hand out 3 soil samples per group in lidded glass jars (approximately 2 tablespoons of soil).
2. Students write a description of each sample on their data table.
3. Students pour 50mL of distilled water into each jar.
4. Close jar and shake well 30 times.
5. Let the soil sample settle for 3 minutes.
6. Repeat steps 4 and 5 for each soil jar.
7. Rinse the pH probe with the rinse bottle of distilled water.
8. Place the pH probe in the liquid part of the soil and water mixture and briefly swirl.
9. When the reading stabilizes, record the pH value in your data table (approximately 3 minutes).
10. Recap the jar. Rinse the pH probe with the rinse bottle.
11. Repeat steps 8 and 9 for each soil jar.
12. Rinse the pH probe a final time and place cap on probe.

## Materials

- pH probeware
- Distilled water
- Tap water
- 3 soil samples per group
- Lidded glass jars
- Filter paper
- 100mL graduated cylinders
- Rinse bottles
- Beakers
- Containers with holes in the bottom.
- One worksheet per group (attached)

### *Procedure for Water Absorption*

1. Students place 3 tablespoons of soil on a piece of filter paper.
2. Student 1 places filter paper/soil into the container with holes in the bottom
3. Student 2 holds this container over a beaker.
4. Pour 100mL of tap water through the soil, collecting the water in the beaker.
5. Let the sample drip for 1 minute.
6. Use the 100mL graduated cylinder to measure the amount of water in the bottom container. Record on your data table.
7. Repeat steps 1 through 7 for each soil sample.

### *Analyzing your Data*

1. Have students complete the portion of the worksheet below the data table.
2. Have a class discussion.

### **Extension**

1. Students can collect soil samples from home to bring in for testing.
2. Students can graph their results on graph paper or using Excel's graphing feature.
3. Students can research soil conservation.

### **Assessment**

The teacher will use the group discussion and worksheet as an assessment.

### **Credits**

Cristina Solis

**National Science Education Standards (NSES):**

**Content Standards, Grades 5-8**

Content Standard A: Science As Inquiry

- a. Abilities necessary to do scientific inquiry

Content Standard D: Earth and Space Science

- a. Structure of the earth system

**Content Standards, Grades 9-12**

Content Standard A: Science As Inquiry

- a. Abilities necessary to do scientific inquiry

Content Standard B: Physical Science

- b. Structure and properties of matter

Content Standard F: Science In Personal and Social Perspectives

- c. Natural resources

## Soil Study

Sample	Description	pH	Water Volume Before (mL)	Water In Beaker (mL)	Water Absorbed by Soil (mL)
1			100		
2			100		
3			100		

### ***ANALYZING YOUR pH DATA***

1. *Were any samples acidic? Which ones?*

2. *Were any samples basic? Which ones?*

3. *Were any samples neutral? Which ones?*

4. *Reflect on all your soil samples, does soil tend to be more acidic, basic or neutral? Why do you think that is?*

### ***ANALYZING YOUR WATER ABSORPTION DATA***

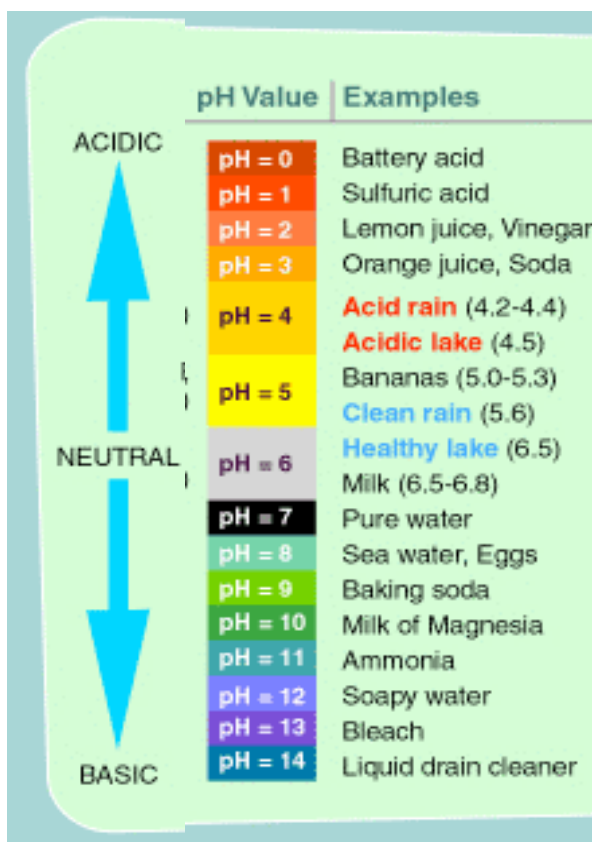
5. *Which soil samples held the most water?*

6. How does a soil's ability to hold water relate to soil erosion?

## CONCLUSION

7. So what do you think are characteristics of good soil?

Students should already be familiar with pH values, this table below is for your reference.



	pH Value	Examples
ACIDIC ↑	pH = 0	Battery acid
	pH = 1	Sulfuric acid
	pH = 2	Lemon juice, Vinegar
	pH = 3	Orange juice, Soda
	pH = 4	Acid rain (4.2-4.4) Acidic lake (4.5)
	pH = 5	Bananas (5.0-5.3) Clean rain (5.6)
NEUTRAL	pH = 6	Healthy lake (6.5) Milk (6.5-6.8)
↓ BASIC	pH = 7	Pure water
	pH = 8	Sea water, Eggs
	pH = 9	Baking soda
	pH = 10	Milk of Magnesia
	pH = 11	Ammonia
	pH = 12	Soapy water
	pH = 13	Bleach
	pH = 14	Liquid drain cleaner

source: United States Environmental Protection Agency