

What is soil?

- a. Naturally deposited unconsolidated material which covers the earth's surface whose chemical, physical, and biological properties are capable of supporting plant growth.
- b. Product of natural decomposition forces acting upon native rocks, vegetation, and animal matter over an extremely long period of time; in some cases literally thousands of years.
- c. There are five factors involved in the formation of natural soils:
 - 1) living matter (organic matter: decayed plants and animals)
 - 2) climate (weathering)
 - 3) parent materials (rocks, weathered rocks: gravel, sand, silt, clay)
 - 4) relief (landform, topography)
 - 5) time
- d. Soil is not just dirt; it is a factory where everything needed to feed plants, animals, and human beings are made—Wilson.

What will we be testing in the soil?

The major essential nutrient elements supplied through the soil are:

- 1. Nitrogen - 80% of the earth's atmosphere. IT is a major element of essential compounds such as amino acids, nucleic acids, enzymes, and many vitamins. It is involved in almost all of the biochemical processes which compose and sustain plant and animal life. It is a component of the chlorophyll in green plants, but in large amounts can have a negative effect on plants in excess amounts.
- 2. Phosphorus - Is necessary for the hardy growth of the plant and activity of the cells. It increases the palatability of plants and stimulates the formation of fats, convertible starches, and healthy seed. It increases the resistance to disease. In excess, it does not have a negative effect.
- 3. Potassium - 2.3% of the earth's surface. Soils with high clay content usually have high potassium content as well since clay develops from decomposition of potassium-rich primary minerals. Contributes to a thicker cuticle on the plant which guards against disease and water loss. Enhances fruit size, flavor, texture, and development.
- 4. pH-Measurement of acidity or alkalinity (basicity) of a substance. Scale ranges from 0-14. 7 being neutral, below 7 are acidic and above 7 are basic or alkaline. pH is measured by the amount of the hydrogen ion concentration is present. Most soil requires a pH of 6.0 - 6.5.

How to collect and prepare soil for testing:

- a. When taking a soil sample from a lawn, a person should take a sample from the upper two to three inches of soil. When taking a soil sample from farm/garden soil, take the upper six to eight inches of soil. When analyzing a specific area of soil, take samples from different locations within the area and mix them together.
- b. A clean trowel, spoon or knife can be used to obtain the samples.
- c. Collect four or five heaping teaspoons of soil. (*For our class purposes, fill the container.*)
- d. Place the soil samples in the plastic container. Close the lid.
- e. The soil should not be touched with the hands any more than is absolutely necessary.
- f. After the sample is collected, it should be placed on a piece of clean paper or plastic. The soil should be allowed to dry in the air for several hours or overnight. **DO NOT BAKE THE SOIL** to accelerate drying.
- g. All foreign matter (leaves, roots, stones, etc.) should be removed.
- h. All lumps should be crushed until the largest clumps are not larger than 1/8 inch diameter.

Name _____ Date _____ Section _____

Life Science 7 Soil Unit
Lab Activity A "Soil Composition"

Challenge Question: _____

Part I. What is soil? (Record what you know about soil currently before completing this lab.)

Part II. Stopping to Think

Answer the "Stopping to Think" questions as you read through the lab packet "Soil Composition".

Stopping to Think 1:

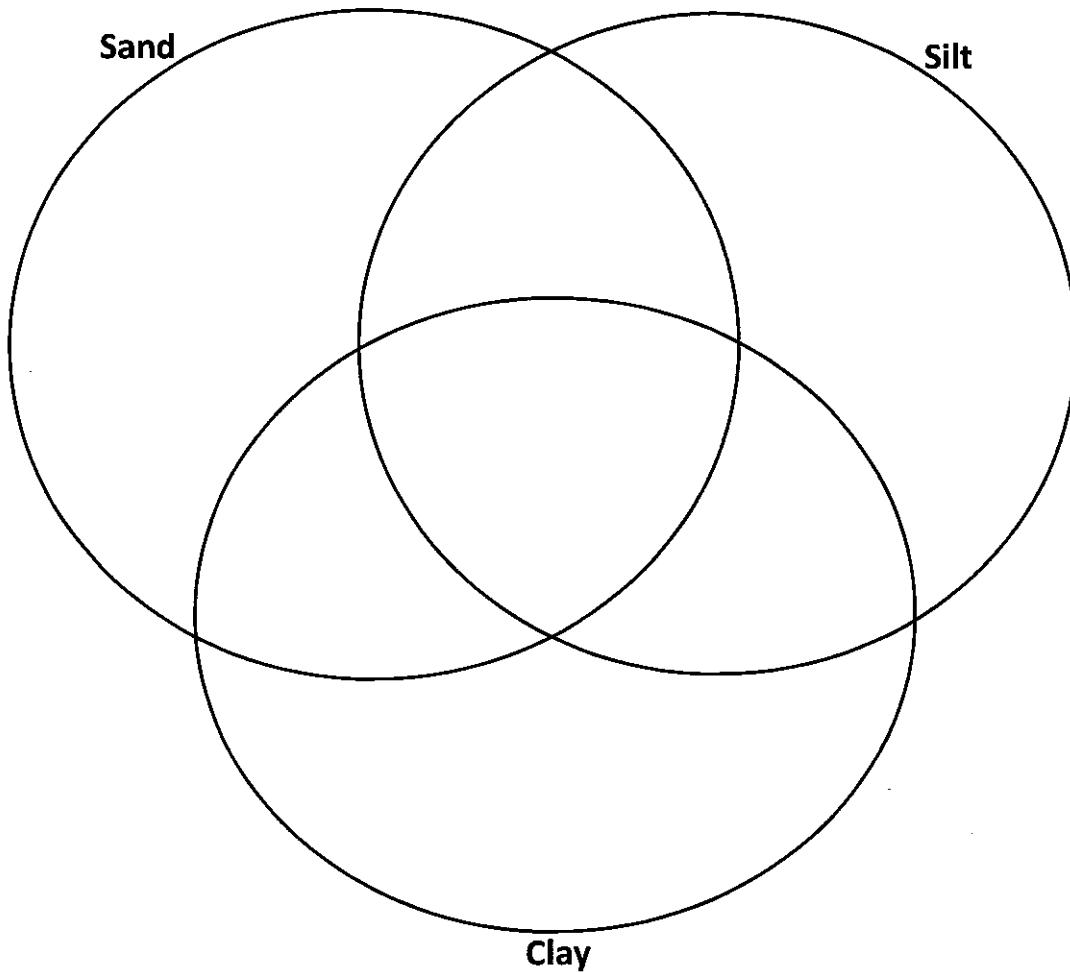
Stopping to Think 2:

Stopping to Think 3:

Stopping to Think 4:

Analysis Questions

1. Record the characteristics of sand, silt, and clay in the circle with that label. In the spaces that overlap, record common features.



2. A dead leaf falls from a tree to the ground. If left undisturbed, what will happen to it?

3. Earthworms help organic matter decompose. In what soil layer do earthworms live? Explain your answer.

4. Revise your answer to the question: "What is soil?" Write as complete a description as you can.

Name _____ Date _____ Section _____

Soil Unit Activity 5B Lab: Describing Soil Scientifically

Challenge Question: How do scientists describe soil?

Background: List three facts you learned about soil already.

Vocabulary:

Term	Definition	Picture/Example
color		
consistence		
texture		
composition		

Materials:

Soil A Soil Color Chart Soil B Soil C water

Procedure:

1. Read and follow directions in "Describing Soil Scientifically" lab packet (pgs. A-23 to A-25).

Data/Results:

Table 1 Soil Observations

Soil Composition	Soil A	Soil B	Soil C
Color			
Consistence			
Texture			

Analysis Questions: Answer all Analysis Questions #1 - 4 on a separate sheet of paper. Use data & evidence to support your answers. Write in complete sentences.

Conclusion: How do scientists describe soil? Use data, evidence and examples from the lab activity to support your answer.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Activity 5C Lab: Macronutrients in Soil

Objectives:

- Collect and Prepare soil samples for testing
- Identify the three components found in soil types
- Discover the four types of soil testing that we use
- Identify the organisms found within the soil

Challenge Question: What is soil and how do we collect and test soil?

Background:

Soil and the Rock Cycle:

- The exposure of rocks to weathering and erosion at the earth's surface breaks them down into smaller grains producing soil.
- The grains (soil) are transported by wind, water and gravity and eventually deposited as sediments. This process is referred to as erosion.
- The sediments are deposited in layers and become compacted and cemented (lithified) forming sedimentary rocks.

Vocabulary:

Term	Definition	Picture
macronutrients		
organic		
inorganic		
erosion		
humus		
soil		
Dust Bowl		

Materials:

rapitest® Soil Test Kit

Ecology and the Environment book**Procedures:**

1. Read pages 226 - 229 in *Ecology and the Environment* book.
2. Follow teacher directions to collect soil sample from school ground. (*This step may be done prior to activity.*)
3. Read and follow the directions to prepare your soil sample for testing. Refer to rapitest® Soil Test Kit instructions.
4. Observe and draw your soil sample with as much detail as possible. Record observations in Table 1.
5. Read and follow the directions to conduct the rapitest® Soil Test Kit. Record data from your soil tests in Table 2.
6. Complete Vocabulary. Answer Analysis Questions. Write Conclusion.

Data/Results:

Table 1

Soil Observations

Organic Materials found in soil sample	Inorganic Materials found in soil sample

Table 2

Soil Test Results

Test	Result G1	Result G2	Result G3	Result G4	Mean
pH					
N Test (nitrogen)					
P Test (phosphorus)					
K Test (potassium)					

Analysis Questions:

1. What is soil?

2. Describe the composition of soil.

3. Identify and describe the different soil types (sandy, loamy, clay). What type of soil is your sample?

Conclusion: How do the macronutrients in soil contribute to the growth and development of plants? Use data, evidence and examples from the lab, book reading, and lecture notes to support your answer.

[illegible]

Name _____ Date _____ Section _____

Soil Unit Activity 5D Lab: Nutrients in Soil

Challenge Question: How does soil help plants grow?

Background: How does the soil composition in Arizona differ from the soil composition in Florida?

Vocabulary:

Term	Definition	Picture/Example
fertilizer		
nutrients		

Materials:

SS 9.1 "Comparing Soils" data
sheet

1 Plant Puzzle
6 Soil Cards

3 Nutrients Cards

Procedure:

1. Read and follow directions in "Nutrients in Soil" lab packet.
2. Answer Analysis Questions.
3. Complete Vocabulary.
4. Write Conclusion.

Data:

Record data in SS 9.1 "Comparing Soils" data sheet. Use the back side of the data sheet to make the concept map for Part B of the Procedures.

Analysis Questions:

1. What do plants need to grow?

2. Describe the relationship among

a. plants, soil, and nutrients

b. plants, soil, and fertilizers

3. Sometimes plants are grown without soil in a method called hydroponics. Hydroponic plants are grown by putting nutrients usually found in soil in the plant's water. Which is more important - soil or water - for plant growth? Why?

Conclusion:

How does soil help plants grow? Use data, evidence and examples from the lab activity to support your answer.