Lesson 1: Importance of Soil

Georgia Performance Standards:..... AG-NR-4

ACADEMIC STANDARDS. ELA9LSV1, ELA9LSV2, SESh2, SCSh9, SES3, SEV2 SES4, SSWG1

Objectives:

1. Define soil and explain how it is developed.
2. Describe the functions of soil.
3. Specify the importance of soil to the lives of humans.

Teaching Time: 2 Hours

Grades: 9-12

Essential Question: What is soil?

Unit Understandings, Themes, and Concepts:

Students will gain an understanding of what comprises soil, as well as its role in the environment and importance to humans.

Primary Learning Goals: Students will be able to explain how soil is formed, as well as its functions and importance to humans.

Students with disabilities: For students with disabilities, the instructor should refer to the individual student's IEP to insure that the accommodations specified in the IEP are being provided within the classroom setting. Instructors should familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation within any given instructional activity or requirement.

Assessment Method/Type:

____ Constructed Response	____ Peer Assessment
_X__ Combined Methods	____ Selected Response
____ Informal Checks	____ Self Assessment

References:

The National Council for Agricultural Education. *Applied Environmental Science*. Alexandria, VA. 1996.

Powerpoints:

Soil_and_Plants_Nancy_Williams.ppt
Soil_Fertility_Andrew_Laca.ppt
Soil_Origin_and_Development_Nancy_Williams.ppt
Soil_quiz_game_Corbett_2007.ppt
Soils_Guide.pdf
Soils_1_Soil_Science_Casey_Osksa.ppt
Envirothon_soil_Introduction.ppt

Materials and Equipment:

See above reference for materials

Georgia Performance Standards:

AG-NR-4. Students will describe the properties of soil and nutrient analysis, determine the capability of the land and the effects of erosion, and describe soil stewardship in Georgia.

a. Explain the development of soil and how it functions.
b. Describe soil characteristics and how they affect the use of land.
c. Differentiate between mechanical and vegetative soil erosion control.
d. Identify government agencies and programs and their involvement in soil conservation.

Academic Standards:

ELA9LSV1 *The student participates in student-to-teacher, student-to-student, and group verbal interactions.*

ELA9LSV2 *The student formulates reasoned judgments about written and oral communication in various media genres. The student delivers focused, coherent, and polished presentations that convey a clear and distinct perspective, demonstrate solid reasoning, and combine traditional rhetorical strategies of narration, exposition, persuasion, and description.*

SCSh2 Students will investigate the flow of energy and cycling of matter within an ecosystem and relate these phenomena to human society.

SCSh9 *Students will enhance reading in all curriculum areas.*

SES3 Students will explore the actions of water, wind, ice, and gravity that create landforms and systems of landforms (landscapes).

SEV2 Students will demonstrate an understanding that the Earth is one interconnected system.

SES4 Students will understand how rock relationships and fossils are used to reconstruct the Earth's past.

SSWG1 The student will explain the physical aspects of geography.

TEACHING PROCEDURE

Introduction and Mental Set

Pass two bowls of soil around the class and ask students what they think the soil is. Prompt students to refer to it as soil rather than dirt. If the soils are different, explain that soils can be and are different all over the world. Ask the following questions:

What is this (in the bowls)?
What is in soil?
Can you or I make soil?
Is soil valuable?
If we are going to learn about soil what do we need to learn?

Discussion

1. **What is soil?**
   Show Transparency Master 1: Composition of Average Soil

- **To** a soil scientist (pedologist), soils are organized natural bodies similar to different types of ecosystems (rain forests, temperate forests, prairie grasslands). This is called a pedological view of soil.
- An agronomist defines soils as the unconsolidated upper part of the earth's crust capable of supporting terrestrial plant life. This is called the edaphological view of soil.
- Geologists and engineers consider any unconsolidated material at the surface of the earth soil. This is called the geologic view of soil.

2. **How is soil developed?**

Transparency Master 2: The Physical Breakdown of Rocks
Give students an empty jar and ask them to identify what they would include to make the ideal soil. What elements are in the natural environment that could be used to make soil?

Soil is made-up of mineral matter, air, water, decaying organic matter, and living organisms. Minerals are inorganic compounds in the earth's crust. Most rocks are mixtures of minerals. Organic matter is material of plant or animal origin that decays in the soil. Highly degraded soil organic matter is called humus. Humus is a gelatin-like substance that binds soil particles together. For ideal plant growth, a soil will be approximately 45 % minerals, 5% organic matter, 25% air, and 25% water on a volume basis.

The factors that effect the rate of soil formation and the type of soil that form are:
-The type of original material, parent material, such as limestone, alluvial deposits, and glacial deposits.
- The climate, average temperature, and rainfall.
- The type of organisms that live on and in the land, including plants, man, and animals.
- The topography of the land, whether it is steep or flat.
- The length of time that the parent material has been weathered.

3. What are some functions of soil?

- As a medium for plant growth, soil performs four functions: Soil serves to anchor roots, supplies water to plants, provides air for the breathing of plant roots, and furnishes minerals for plant nutrition.

- As a geologic substance soil serves as a roadbed, an aggregate for concrete and asphalt, a foundation for structures and bodies of water, and is used in landfills.

4. Why is soil important to humans?

A. Transparency Master 3: Soil-Plant-Animal Cycle
B. Transparency Master 4: Humans and the Soil
C. Transparency Master 5: Why Soils are Important
D. Identify a list of items in the classroom. Have students determine how these items can be traced back to soil and emphasize the point that without soil we would not have these items.

- All of the crops we grow, the livestock we raise, and the commodities we trade are dependent on soil and its fertility.
- All terrestrial life on earth depends on soil and its products to live.
- With such a large human population, demands upon soil will be greater in order to produce the food required.
- Soil also acts as a filtration system for the hydrologic cycle.

5. Activity

Build a list of examples for each of the following situations:

A. Where humans create barriers for soil conservation
B. Where plants are not adequately anchored
C. Where soil affected human societies
D. Recreational uses for soil surfaces
E. Agricultural uses of soil for specific crops

SUMMARY

Soil is formed from the decomposition of minerals and organic matter brought on by rain, heat, cold, freezing, thawing, wetting, drying, wind and by rivers, glaciers, and landslides in a

process known as weathering. The composition of average soil is approximately 45% mineral matter, 50% pore space (25% air, 25% water), and 5% organic matter.

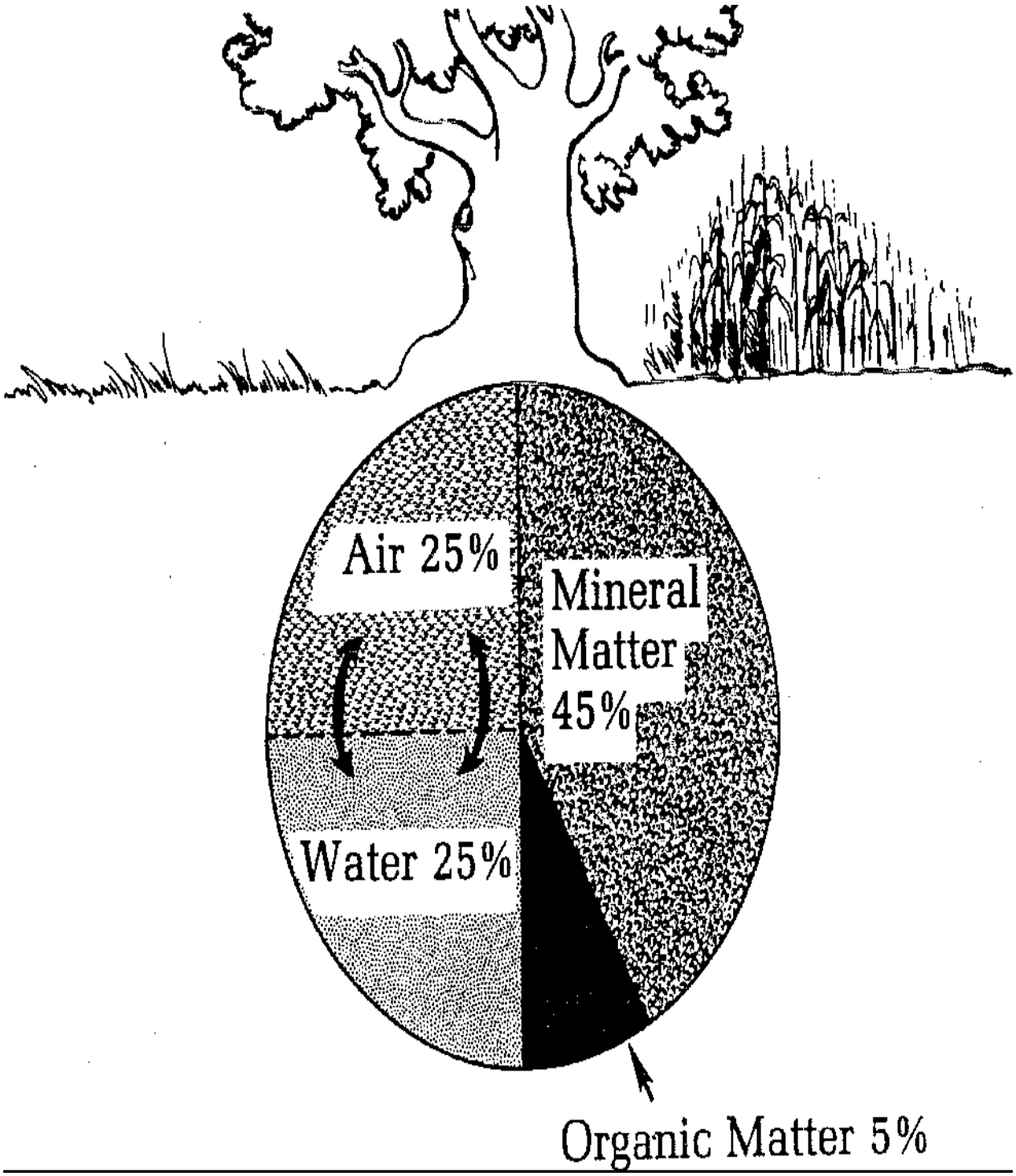
Functions of soil include anchoring roots, supplying water, minerals, and air for plants. As a physical substance soil serves as a roadbed, an aggregate for concrete and asphalt, and a foundation for structures and bodies of water.

Soil is important because all terrestrial life is dependent upon soil to live. It supports plant growth, and also acts as a filtration system for the hydrologic cycle.

Evaluation

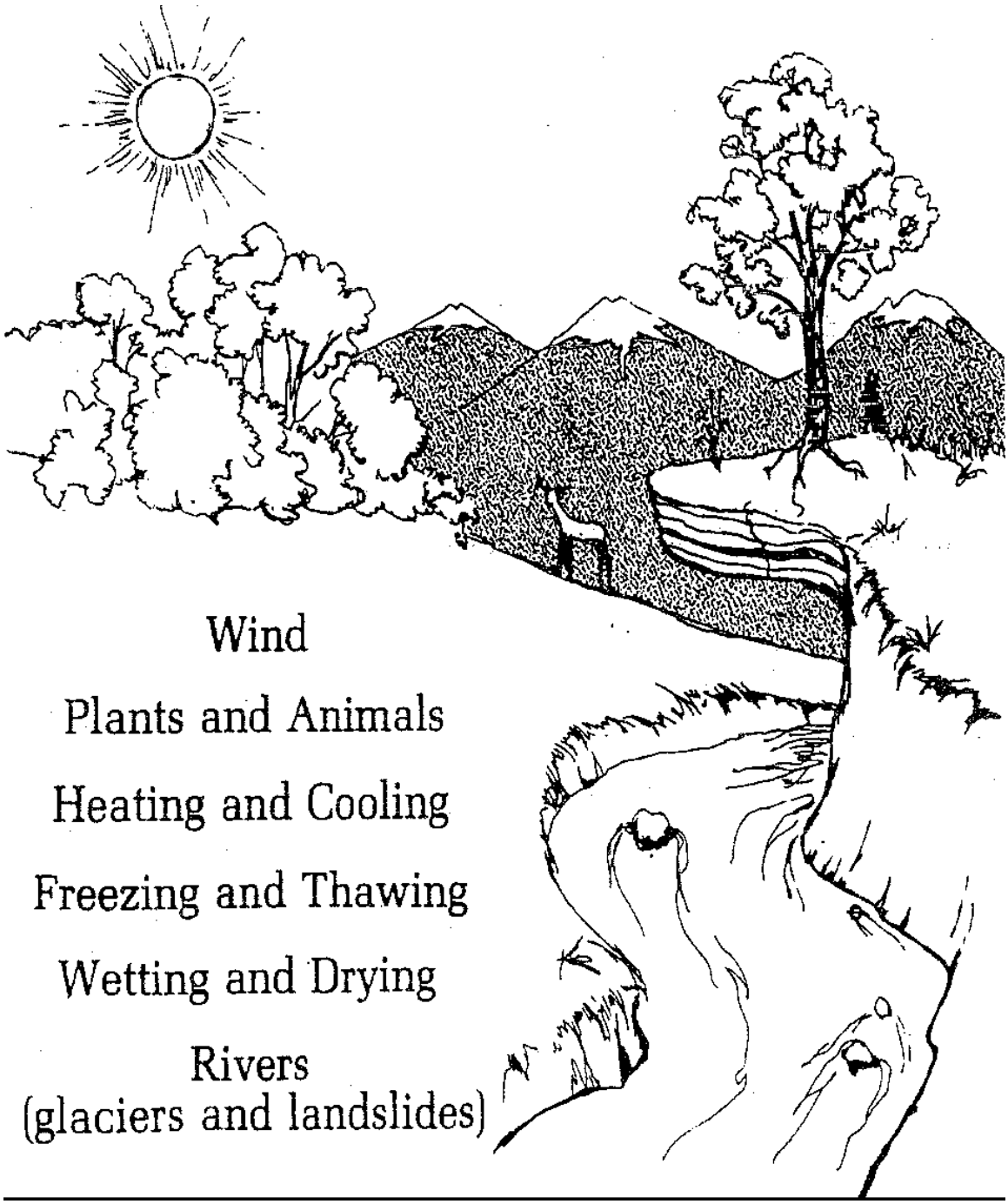
Written test and lab activities as per the reference book.

TM-1
COMPOSITION OF AVERAGE SOIL



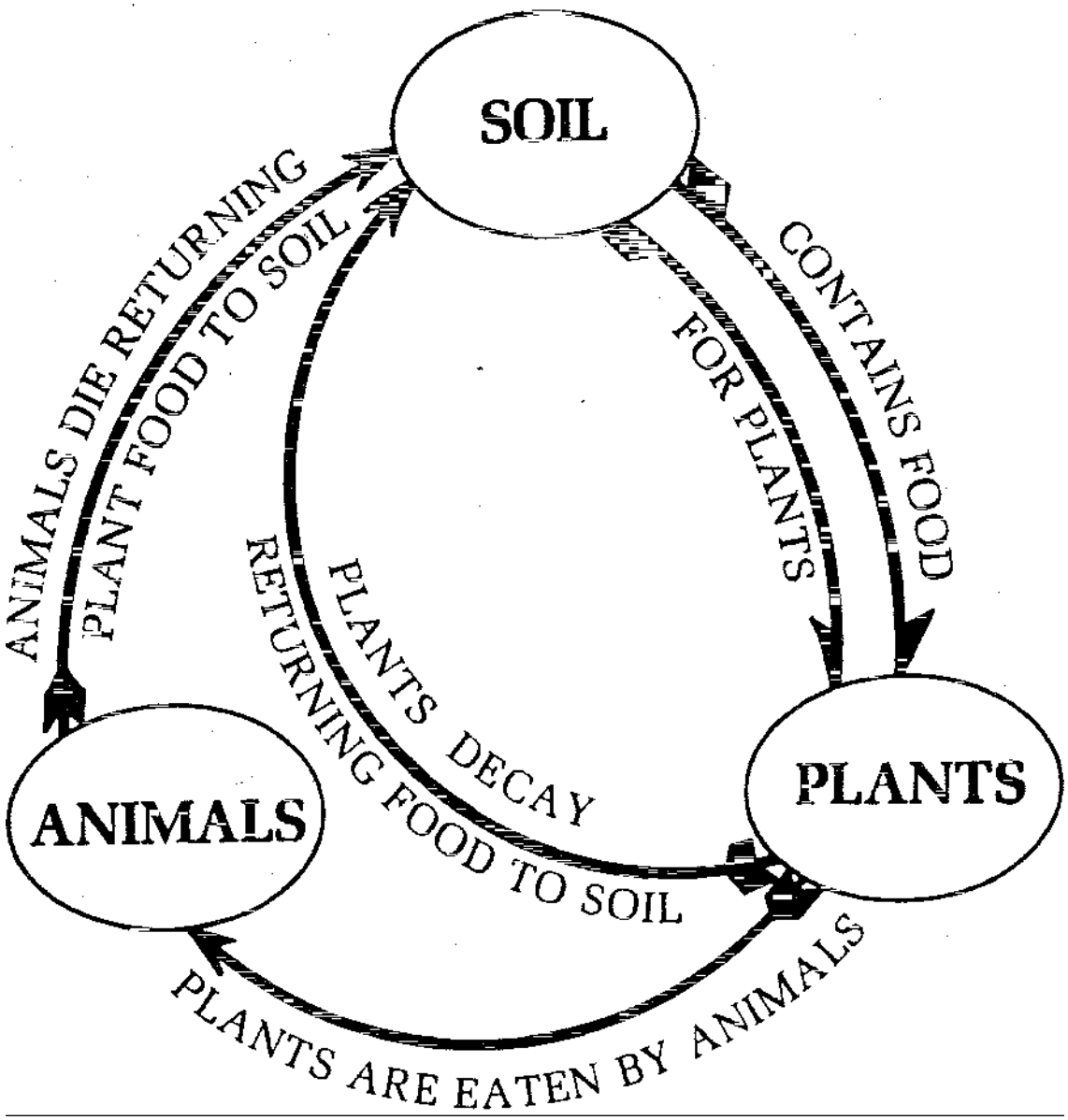
TM-2

PHYSICAL BREAKDOWN OF ROCKS

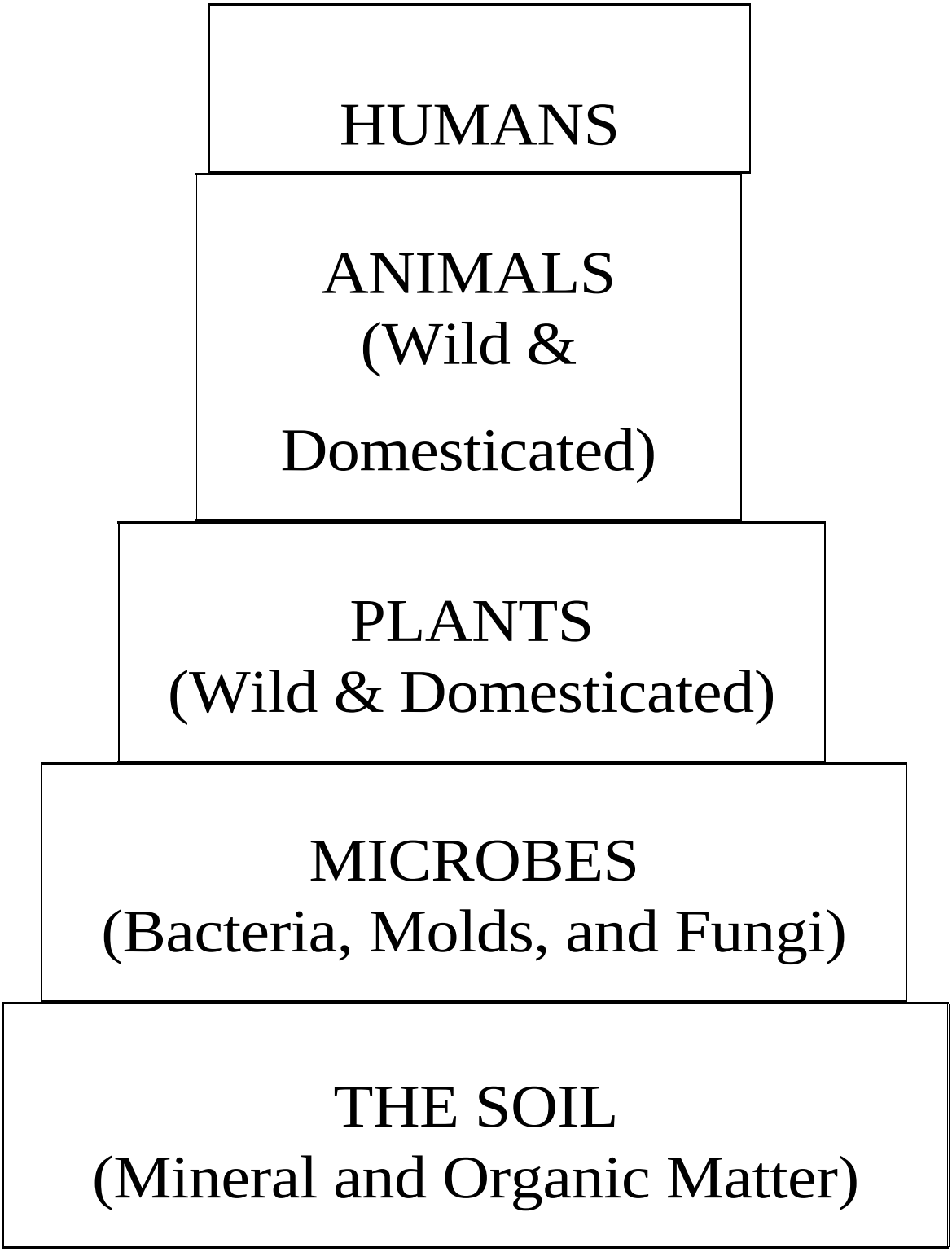


TM-3

SOIL-PLANT-ANIMAL CYCLE



TM-4 Humans and the Soil



Why Soils are Important

- ✓ Plants grow in and on soil
- ✓ Plants support animal life
- ✓ Plants and animals support human life
- ✓ The World population is increasing
- ✓ A large part of the world's population has inadequate nutrition
- ✓ The World supply of productive soil is limited
- ✓ Improved soil management could feed more people

Individual Learning Activity

Lesson: Importance of Soil

Assignment: Choose one of the topics below and research it. Write a report on your findings that answers the question or explains the concept and shows why it is relevant to your life.

1. Define soil and explain how it is developed.
2. Describe the functions of soil.
3. Specify the importance of soil to the lives of humans.

Minimum Requirements:

1. Paper must be typed in 12 point font and at least one page in length. The paper may be double-spaced.

2. At least two credible references must be properly cited.

3. All work must be original. No plagiarism! Any use of another's ideas without giving credit will result in a zero.

4. Papers will be graded on content (amount of good information, accuracy, etc.) and mechanics (grammar, spelling, and punctuation.)

Due Date:

Points/Grade Available:

Individual Learning Activity Rubric

Content - offers current information on the topic chosen, thoroughly covers each aspect of the question, and demonstrates understanding and mastery of the lesson. The paper should include information and issues of state and local importance.	35 pts.
Critical Analysis - logical process of analyzing and reporting information that examines and explains the topic selected. The paper should go beyond simply listing facts and must include why the concept is relevant to the student's life.	25 pts.
Organization- The paper should have an orderly structure that demonstrates a logical flow of ideas.	15 pts.
Mechanics- spelling, grammar, punctuation, font size, double spacing, citation, etc. Essentially, the paper should meet all specifications and be executed following rules of proper written English.	15 pts.

Group Learning Activity

Lesson: Importance of Soil

Assignment: Choose one of the topics below and research it. With your group, prepare a presentation to teach the class your concept.

1. Define soil and explain how it is developed.
2. Describe the functions of soil.
3. Specify the importance of soil to the lives of humans.

Your presentation should include the following:

1. **A lesson plan outlining exactly what your group will teach and how the information will be taught**
2. **A Power Point of at least twelve slides**
3. **Notes containing the information the class will be responsible for (these can be printed and given to the class, written on the board, or part of the Power Point). A copy of the notes will be turned in to the instructor.**
4. **Some type of interactive activity for the class (game, problem solving activity, interactive model, etc.)**
5. **Your group must also prepare an assessment for the class. This assessment can be written or oral, but should show the instructor that the class understands and has retained the material being taught.**

Due Date:

Points/Grade Available:

All work must be original. No plagiarism! Any use of another's ideas without giving credit will result in a zero.

Group Learning Activity Rubric

Lesson Plan – The group submits a thorough, detailed lesson plan highlighting the content and organization of their lesson.	10 pts.
PowerPoint – The group presents a Power Point of at least twelve slides that contains information and pictures vital to the lesson with additional information or examples for enhancement.	20 pts.
Interactive Activity – Some type of interactive activity is used to help teach the lesson. The activity should contribute to the mastery of content and involve the entire class in some way.	15 pts.
Assessment – A fair, thorough assessment is prepared and administered based on the information presented to the class. Poor grades on the assessment by a few members of the class are excusable, but if the entire class has difficulty, the points awarded in this category may be lowered at the discretion of the instructor.	15 pts.
Content – The group should cover the concept (within reason) in entirety. The group may study actual lesson plans to help decide what should be emphasized.	25 pts.
Overall Effect – The group is prepared, enthusiastic, and interesting, and the lesson flows smoothly.	15 pts.

Presentation Learning Activity

Lesson: Importance of Soil

Assignment: Choose one of the topics below, research it, and prepare a presentation that answers the question or explains the concept and shows why it is relevant to your life.

1. Define soil and explain how it is developed.
2. Describe the functions of soil.
3. Specify the importance of soil to the lives of humans.

Minimum Requirements:

Oral Report Option

1. **Write a paper on one of the topics and orally present your work to the class.**
2. **Paper may be double-spaced and should be at least one page in length, resulting in a two to five minute presentation.**
3. **At least two references must be properly cited.**
4. **The presentation of the report will be graded secondary to the content of the paper.**

PowerPoint Option

1. **Presentation should be at least ten slides in length**
2. **Presentation should include at least four photos.**
3. **Presentation should be two to five minutes in length.**
4. **Grammar and spelling will be graded by the same standards as any other written assignment.**
5. **At least two references must be properly cited.**

Poster Option:

1. **Prepare a poster that answers/explains one of the topics. You will present your poster to the class.**

2. **Your poster should include both text and graphics that help communicate your research.**
3. **At least two sources of information should be properly cited on the back of the poster.**
4. **Neatness and appearance of the poster will be graded.**
5. **Poster presentation should last two to five minutes.**

Due Date:

Points/Grade Available:

For all presentations: All work must be original. No plagiarism! Any use of another's work or ideas without giving proper credit will result in a zero.

Presentation Learning Activity Rubric

Content- offers current information on the topic chosen, thoroughly covers each aspect of the question, and demonstrates understanding and mastery of the lesson. The presentation should include information and issues of state and local importance.	40 pts.
Critical Analysis/Organization – The presentation shows a logical process of analyzing and reporting information that examines and explains the topic selected. The presentation should go beyond simply listing facts and must include why the concept is relevant to the student's life.	20 pts.
Presentation – The student makes a genuine effort to present, not just read the material. The student should present with confidence using techniques like eye contact and voice inflexion to make his or her point. Although content takes precedence over presentation, the experience of successfully presenting in front of a class is part of the basis of this assignment.	25 pts.
Mechanics- spelling, grammar, punctuation, font size, double spacing, citation, etc. Essentially, the presentation should meet all guidelines set forth and should be executed in proper written English. For the poster, this includes neatness and appearance.	15 pts.

Teacher Notes

Essential Question: What is soil?

Vocabulary

Soil

Hydrologic Cycle

Weathering