

# Soil Searching

**Grades:** 4<sup>th</sup>-8<sup>th</sup>

**Duration:** 55 minutes

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## **Program Description**

Students will analyze a soil profile taken from the banks of the Red River in terms of structure, color, consistence, texture, presence of carbonates, rocks and organic material. Their observations and conclusions will be placed on the GLOBE website for world-wide scientists to use.

## **Louisiana GLEs:**

### **Science**

#### **Grade 4**

1. Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)
2. Pose questions that can be answered by using students' own observations, scientific knowledge, and testable scientific investigations (SI-E-A1)
3. Use observations to design and conduct simple investigations or experiments to answer testable questions (SI-E-A2)
6. Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2)
7. Use the five senses to describe observations (SI-E-A3)
8. Measure and record length, temperature, mass, volume, and area in both metric system and U.S. system units (SI-E-A4)
9. Select and use developmentally appropriate equipment and tools (e.g., magnifying lenses, microscopes, graduated cylinders) and units of measurement to observe and collect data (SI-E-A4)
10. Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral and written explanations as appropriate (SI-E-A5) (SI-E-B4)
11. Combine information, data, and knowledge from one or more of the science content areas to reach a conclusion or make a prediction (SI-E-A5)
19. Describe procedures and communicate data in a manner that allows others to understand and repeat an investigation or experiment (SI-E-B5)
56. Investigate the properties of soil (e.g., color, texture, capacity to retain water, ability to support plant growth) (ESS-E-A1) .
63. Demonstrate and explain how Earth's surface is changed as a result of slow and rapid processes (e.g., sand dunes, canyons, volcanoes, earthquakes) (ESS-E-A5) (ESS-E-A1)

## **English Language Arts**

### *Speaking and Listening*

#### *Standard 4*

34. Adjust pacing to suit purpose, audience, and setting when speaking
35. Interpret, follow, and give multi-step directions
37. Demonstrate active listening strategies, including asking questions, responding to cues, and making eye contact
38. Adjust speaking content according to the needs of the audience

### *Information Resources*

#### *Standard 5*

45. Paraphrase or summarize information from a variety of sources

## **Grade 5-8 Science and Inquiry**

6. Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3)
7. Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)
19. Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)
22. Use evidence and observations to explain and communicate the results of investigations (SI-M-A7)
38. Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6)

## **Science**

### **Grade 5**

4. Identify the physical and chemical properties of various substances and group substances according to their observable and measurable properties (e.g., conduction, magnetism, light transmission) (PS-M-A3)
30. Identify organic and inorganic matter in soil samples with the aid of a hand lens or microscope (ESS-M-A4)

## **English Language Arts**

### *Speaking and Listening*

#### *Standard 4*

32. Adjust diction and enunciation to suit the purpose for speaking
33. Use complete sentences and standard English grammar, diction, syntax, and pronunciation when speaking
35. Restate or describe oral directions/procedures for tasks
36. Adjust volume and inflection to suit the audience and purpose of presentations
38. Demonstrate active listening strategies
39. Deliver formal and informal presentations for a variety of purposes, including:
41. Participate in group and panel discussions

### **Grade 8**

14. Distinguish between chemical and mechanical (physical) weathering and identify the role of weathering agents (e.g., wind, water, ice, gravity) (ESS-M-A4)
15. Illustrate the role of organic processes in soil formation (ESS-M-A4)

## **Key Terms:**

**Blocky Structure** – Irregular blocks that are usually 1.5 - 5.0 cm in diameter

**Clay** – The smallest fraction of the three soil particles, sand, silt and clay; clay has a sticky feeling when samples are rubbed.

**Columnar Structure** – Vertical columns of soil that have a white, rounded salt “cap” at the top. Found in soils of arid climates.

**Color** – Physical trait of soil based on the amount of light reflected off the soil particles. Soil colors use the Munsell Coloring System.

**Consistence** – A description of how easily a soil breaks apart when pressed- can be friable, which means that it breaks apart easily, or firm, which means that it takes a lot of pressure for the soil to break apart.

**Extremely Firm Consistence** – When a ped can’t be crushed with your fingers (you need a hammer)

**Friable Consistence** – When a ped breaks with a small amount of pressure.

**Firm Consistence** – When the ped breaks when you apply a larger amount of pressure and the ped dents your fingers before it breaks.

**Granular Structure:** Resembles cookie crumbs and is usually less than 0.5 cm in diameter. Commonly found in surface horizons where roots have been growing.

**Gray Colors** – Gray colors are found where water has come in contact with the soil. Gray colors arise from chemical reactions where oxygen is removed from the soil

**Loam** – A soil intermediate in texture between clay and sand, consisting of a mixture of clay, sand, gravel, silt.

**Loose Consistence** – This is when there is trouble picking out a single ped and the structure falls apart in your hand. **Note:** Soils with single grained structure always have loose consistence.

**Massive** – A soil that has no visible structure, is hard to break apart appears in large clods

**Munsell Soil Color Book** – A handbook which displays the possible colors of soil and titles each one according to their place on the Color Wheel

**Organic Matter** – Any dead matter within the soil of a natural origin (e.g.: compost)

**Platy Structure** – Thin, flat plates of soil that lie horizontally. Usually found in compacted soil.

**Prismatic Structure** –Vertical columns of soil that might be a number of cm long. Usually found in lower horizons

**Profile** – A vertical section of soil extending from the topsoil into the parent material

**Sand** – The largest fraction of the three soil particles, sand, silt and clay; sand has a gritty texture when moist samples are rubbed.

**Silt** – The second smallest fraction of the three soil particles, sand, silt and clay; silt has a smooth feeling when moist samples are rubbed.

**Silt-loam** – A soil texture description; a texture containing components of silt and loam

**Single Grained** – A soil with no structure that can be broken into individual particles that do not stick together; Always accompanies a loose consistence. Commonly found in sandy soils.

**Soil Matrix** – The soil matrix will have the same color and texture within a give horizon; the dominant characteristics in a horizon is the matrix area

**Soil Structure** – The combination or arrangement of primary soil particles into secondary particles, units, or peds (the shape of the soil units). Some types of structure are granular (which looks like

cookie crumbs), blocky (which looks like small blocks), prismatic (which is prism shaped). Grades of structure are weak, moderate, or strong depending on how easy it is to distinguish the type of structure.

**Soil Texture** – The way the soil feels, based on the amount of sand, silt, and clay

**Connections to Permanent Exhibits:** Red River Gallery

**Rocks of Louisiana:** Explore the rocks of Louisiana. What are they and where do they come from?

**Glow Rocks:** Look at the phosphorescent rocks. Why do they glow? Do you know anything else that is phosphorescent?

**Rock On:** Identify three classes of rocks. Can you give an example of each?

**Rocks and Mineral Display:** Identify samples as a rock, mineral, or fossil. Ask a pilot for a field guide to help you.

### **Web Resources:**

**The Dirt on Soil** Discovery School

<http://school.discovery.com/schooladventures/soil/index.html>

There are three soil activities. Down and Dirty would be good to prepare the students for the Soil Searching Program. Field Guide looks at many organisms that live in the soil. Soil Safari is an interactive, microscopic journey through the soil that allows students to view many of the biotic and abiotic features of the soil.

### **K-12 Teaching Resources and Activities**

Dr. Dirt-Dr. Clay Robinson

<http://www.wtamu.edu/%7Ecrobinson/DrDirt.htm>

Activities for all grades including instructions on making dirt pudding and dirt shirts. Also information about air and water in soil, erosion, and much more.

### **Soils**

National Resource Conservation Services

<http://soils.usda.gov/teachers.html>

This is a website that contains soil facts, information on soil profiles, a photo gallery of natural resource and conservation photos. If you click on the soil education tab, you will be taken to a list of resources in pdf format that include careers in soil education, posters, materials for teachers and students, and much more.

### **Soil-net.com**

National Soil Resources Institute of

Cranfield University of Silsoe, UK

<http://www.soil-net.com/>

Resources for middle school and high school students on soil, soil types, weathering, soil formation, etc. There is also a whole list of activities about soil and downloads.

### **Pre-Visit Activities**

### **Post-Visit Activities**