Georgia Performance Standards Framework for Earth Science – Grade 6

Unit: Weathering and Erosion

General Task
What is in Our Soil?

Standards (Content and Characteristics):

**S6E5. Students will investigate the scientific view of how the earth’s surface is formed.**
  h. Describe soil as consisting of weathered rocks and decomposed organic material.

**S6CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.**
  a. Understand the importance of—and keep—honest, clear, and accurate records in science.
  b. Understand that hypotheses are valuable if they lead to fruitful investigations, even if the hypotheses turn out not to be completely accurate descriptions.

**S6CS2. Students will use standard safety practices for all classroom laboratory and field investigations.**
  a. Follow correct procedures for use of scientific apparatus.
  b. Demonstrate appropriate techniques in all laboratory situations.
  c. Follow correct protocol for identifying and reporting safety problems and violations.

**S6CS6. Students will communicate scientific ideas and activities clearly.**
  c. Organize scientific information using appropriate tables, charts, and graphs, and identify relationships they reveal.

**S6CS9. Students will investigate the features of the process of scientific inquiry.**
Students will apply the following to inquiry learning practices:
  a. Scientific investigations are conducted for different reasons. They usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations.
  c. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator’s credibility with other scientists and society.

**S6CS10. Students will enhance reading in all curriculum areas by:**
  a. Reading in All Curriculum Areas
    • Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
Georgia Performance Standards Framework for Earth Science – 6th Grade

- Read both informational and fictional texts in a variety of genres and modes of discourse
- Read technical texts related to various subject areas

c. Building vocabulary knowledge
   - Demonstrate an understanding of contextual vocabulary in various subjects.
   - Use content vocabulary in writing and speaking.
   - Explore understanding of new words found in subject area texts.

d. Establishing context
   - Explore life experiences related to subject area content.
   - Discuss in both writing and speaking how certain words are subject area related.
   - Determine strategies for finding content and contextual meaning for unknown words.

Enduring Understandings:
- Although weathered rock is the basic component of soil, the composition and texture of soil and its fertility and resistance to erosion are greatly influenced by plants and other organisms.
- Weathering is the process that breaks down rock and other substances at Earth’s surface.

Essential Questions:
How does the formation of soil relate to the processes of weathering and erosion?

ADMINISTRATION PROCEDURES

Pre-Assessment:

Chalk-talk: Put a piece of chart paper on the table and ask students to write something that can be found in soil. Or have students write this on the board. Everyone should write something.

<table>
<thead>
<tr>
<th>Outcome / Performance Expectations:</th>
<th>Students will understand the basic components of soil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Teacher Instructions:</td>
<td>Collect soil in advance, have students bring soil to school, or collect it on the school grounds during class. Be sure to collect soil from at least two different places. For example, in the lawn, and in a garden. Or in a forested area and in an open area. The wider the variety of soils available for the class, the better. Teachers should also provide examples of the soil types for students to use as comparisons. Commercial potting soil and sand can also be used for comparisons.</td>
</tr>
</tbody>
</table>
Show one or more videos (or segments of videos) about soil from UnitedStreaming, such as:

The Living Soil (9 min 24 sec)  

TEAMS: Earth Processes: Rocks and Soils (30 min)  
http://gpb.unitedstreaming.com/search/assetDetail.cfm?guidAssetID=50B4796F-56FA-4A4C-894C-03073F1F49F6

| Materials Needed: | Plastic sandwich bags for collecting soil. Zip bags work best  
|                  | Marking pen that can write on a plastic bag  
|                  | Soil samples (these can be collected by the students at home or on the school grounds; be sure there is a variety of soil types)  
|                  | A trowel or small shovel may be used for collecting soil samples  
|                  | 2 sheets of white paper (printer paper is fine) per student  
|                  | Magnifying glass or 10 X hand lens  
|                  | Microscope (binocular stereo-zoom digital microscope, if available)  
|                  | Empty plastic water bottles (individual size) with lids – 2 per student or per group  

| Safety Precautions: | It is recommended that safety goggles be used any time students handle particulate matter. Goggles are to keep soil fragments out of the eyes.  

| Task with Student Directions: | What is in the soil?  
|                              | Collect soil samples from two different spots. For example, you could collect in the lawn and in a garden. Or in a forested area and in an open area or field. The wider the variety of soils available for the class, the better.  
|                              | Collect about a handful of soil from each spot and put it into a zip plastic bag. Seal the bag and label it with a marking pen as to the location where it was collected.  
|                              | You may need to let the soil dry for a day or two if it is wet.  
|                              | Spread each sample out on a separate sheet of white paper. Number your papers 1 and 2, so you can keep your observations for each sample.  
|                              | Record the location where each soil sample was collected (for example, field, forest, lawn, flower garden, etc.)  

### Soil Location

<table>
<thead>
<tr>
<th>Soil sample #</th>
<th>Location where soil was collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Examine each soil sample with your magnifying glass or hand lens (or microscope). Describe what you see in each soil sample. Record your soil data in the data tables below.

### Soil color

<table>
<thead>
<tr>
<th>Soil sample #</th>
<th>What is the color of the soil? Is it light, medium or dark? Is it gray, tan, orange, brown, or another color?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

### Soil Texture

<table>
<thead>
<tr>
<th>Soil sample #</th>
<th>What is the grain size? Is the soil clay-like or sandy? Is it all the same size, or are there larger particles?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Soil Composition

| Soil sample # | Can you identify any minerals using your magnifier?  
|               | Quartz? Clay?  
|               | Can you see any rock fragments?  
|               | Can you see any organic matter?  
|               | Can you see any living organisms? What types?  
|               | (Identify, describe or sketch.)  

1

2

Other Characteristics of Soil

| Soil sample # | How does the soil feel? Rub it between your fingers.  
|               | How does the soil smell? If there is no odor, wet a small amount and rub it between your fingers, and smell it again.  

1

2

Write a paragraph to compare and contrast the two soils. Explain why the two soils are different, keeping in mind that they were collected in different areas. For example, why does the forest soil differ from the field soil? Explain how the mineral material got into the soil. Justify your answer using specific details. Explain how the organic matter got into the soil. Justify your answer using specific details.

Soil comparisons

Students should compare their soils with those that the teacher has brought in as examples. How are they different? How are they similar?

Students should also compare their soils with commercial potting soil, and with sand. How are these materials different from soil you collected? How are they similar?
Why is sand not the same as soil? What components are missing from sand?

**Separating the components of soil**

- Students should take a plastic water bottle and add soil to the bottle to fill it several centimeters deep.
- Add water to the bottle to fill the bottle about half full. Replace the lid on the bottle. Observe carefully and make notes about what you see.
- Next, shake the bottle vigorously for several seconds.
- Put the second soil sample in another bottle, and repeat the procedure above.
- Then, put the bottles aside and allow the soil to settle out of the water. This will take several minutes to a half hour, at least. Allow the bottles to sit undisturbed overnight, if possible.
- After the soil has been allowed to settle for some length of time, observe carefully and make notes about what you see.

- How has the soil changed?
- Can you see layers of sand, silt, and clay?
- Which sediment size is on the bottom? Which sediment size is on the top? Can you explain why this happens?
- Is the water clear or cloudy? How does it change if you give it longer to settle out?

The teacher may want to have several examples of soils in bottles with water that have been allowed to settle overnight, so that the students can see the differences more clearly, with less waiting time. Handle them carefully so that the layers don’t get shaken up while the students are observing the pre-prepared examples.

**Resources:**

Online videos from United Streaming:

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TEAMS: Earth Processes: Rocks and Soils (30 min)
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Book:
# Georgia Performance Standards Framework for Earth Science – 6th Grade

## Homework / Extension:
Examine some soil samples from other areas (for example, if you have a friend or relative in another part of Georgia, or another part of the country.)

If you have a garden, lawn, or farm, have your soil analyzed by the Georgia Extension Service or your county extension office. Check the telephone book under county government. There may be a charge for this service, and it may take several weeks.

Obtain a Soil Survey for your county from the library, the Georgia Extension Service or your county extension office. Check the telephone book under county government. Determine the official soil types for the areas that were sampled. Write a short summary of the soils in the area where you live.

Research methods of soil conservation. Which ones are used in your area? If possible, take digital photos of soil conservation methods.

## Instructional Task Accommodations for ELL Students:
- Have students write two or three sentences rather than an entire paragraph comparing & contrasting the two soils
- Pair students with same-language buddy to assist while examining types of soil
- Elate content to real life by having students bring soil from around areas in which they live to examine

## Instructional Task Accommodations for Students with Specific Disabilities:
- Use varied pacing for task completion
- Use scaffolding by giving several examples prior to initiation of independent student activity
- Provide alternative assessment options permitting students to record written answers on data collecting instrument

## Instructional Task Accommodations for Gifted Students:
- Gifted students further investigate soil contents with digital microscopes
- Independent project such as soil survey of their home county (Georgia Extension Service or your extension office)
- Original action research project exploring 5 types of stone used in home community and two other areas of the state of GA
  - Examples of things to look for:
    - Do any of the rocks have stains on them (such as rust stains from the oxidation of iron-bearing minerals)?
    - Are any of the rocks undergoing dissolution (such as tombstones with inscriptions which are fading, or details on statues which are becoming less distinct)?

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Georgia Department of Education
Kathy Cox, State Superintendent of Schools
Earth Science • 6th Grade • Weathering and Erosion
July 24, 2007 • Page 7 of 8
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| o Do you see lichen or moss growing on any rocks or building materials? |
| o Do any of the roofs and sidewalks have gray streaks or "stains"? |
| o Can you see tree roots disturbing sidewalks or curbs or bedrock? |
| o Have any concrete or terra cotta containers (such as urns or bird baths or flower pots) had water in them that froze and caused them to break? |

- Curriculum compacting