

The Scoop on Dirt

Overall Description:

This unit is designed to address standard S6E5 of the Georgia Professional Standards and specifically addresses element “G” within that standard. The unit will incorporate three lesson activities that help students understand what soil is, how it is formed and how it goes through change over time. In addition it covers some of the “habits of mind” involved in science.

GPS Standards:

S6E5: Students will investigate the scientific view of how Earth’s surface is formed.

S6CS1: Students will explore the importance of curiosity, common 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 keeping honest , clear and accurate records in science.

S6CS2: Students will use standard safety practices for all classroom laboratory and field investigations.

A: Follow correct procedures for use of scientific apparatus.

S6CS3: Students will use computation and estimation skills necessary for analyzing data and following scientific explanations.

A: Analyze scientific data by using and interpreting and comparing numbers in several equivalent forms, such as integers and decimals.

S6CS10: Students will enhance reading in the curriculum areas by :

C: Building vocabulary knowledge

D: Establishing context

Standard S6E5 Element “G”: Describe soil as consisting of weathered rock and decomposed organic material.

Instructional Learning Goal: Soil forms as rock which is broken down by weathering and mixes with other materials.

Instructional Rationale: This unit has been divided into three parts for instructional purposes: the formation of soil, the decomposition of materials to form soil, and the various changes that occur in soils with change over time and with human and natural interactions.

Instructional Guide: After an introduction to the soil unit instructor may use the following three activities as lessons for students to grasp a better understanding of soils and their interaction with their personal and corporate environment.

Part 1: TITLE: Building A Soil

Addresses the part of the learning goal that helps students understand the formation and composition of various types of soils. Using the various soil components, students actually create their own soils.

Previous Knowledge Required: Students have been introduced in class to soils and the basic components of soils.

Procedures: Previous to this lab activity the instructor will need to collect enough soil component materials for each group of 4-6 students to form a soil sample. Lay out all of the various soil components and include some non-soil components so that students must make proper selection in addition to providing reason for their selection.

Component Material Examples: twigs, leaves, humus, clay, litter, water, sand, nail filings, plastic pieces, macro and micro fauna, small rocks with hammer, etc.

1. Have students divide into small groups after instructing them in small group dynamics.
2. Re-instruct students about the basic components of soil and then tell them they are going to make soil today.
3. Have students in small groups go to make selections of materials and then go to individual group areas for constructing their soil.
4. Assessment can involve using attached rubric.
5. Extension activity - Have students use their soil to grow a plant and compare results.

Part 2: TITLE: Deconstructing a Soil

Addresses the part of the learning goal that helps students understand the particle components and textural classification of soils.

Previous Knowledge Required: Students must have been introduced to soil textures and the textural classification system.

Procedures: Previous to this lab activity the instructor will need to collect enough soil of three different textural classifications for students in small groups of 4-6 students to separate into the various soil components. Establish three different locations for each different soil so groups can collect enough sample to take back to their individual lab location for separation technique.

1. Have students divide into small groups after instructing them in small group dynamics.
2. Re-instruct students about the basic components of soil and how it is identified and classified according to the percentages of the various soil textural components.
3. Each group will collect approximately a 16 ounce cup of soil from each soil station.

4. Students will use beakers, balance beam, and scoop to place soil in the separation chamber.
5. Using the soil (separation shaker screens) have groups separate the soil components and determine the amount of each soil component by percentage.
6. Have students classify their soil by using the classification chart provided by instructor.
7. Assessment can involve using attached rubric.
8. Extension activity: Have students determine moisture holding capacity

Part 3 –

SOIL ALTERATION OVER TIME

After various lessons incorporating terms related to soil alteration, students will select from a word bank and classify the terms according to their origin as a “human activity” or “natural activity” as well as their function as having a “positive” or “negative” influence on soil.

For any functions which are determined to be either positive or negative, the student will include statement of explanation to support their response.

The following is a completed table which presents the terms in their classified form and may serve the teacher as a key to scoring. Teacher has the option to make additions to categories.

	POSITIVE	NEGATIVE
HUMAN ACTIVITY	<ol style="list-style-type: none"> 1. Reforestation 2. Flood control 3. Soil Conservation 4. Nutrient Modification 	<ol style="list-style-type: none"> 1. Deforestation 2. Pesticides/Fertilizers 3. Mono culture activities 4. Residential/Commercial Development
NATURAL ACTIVITY	<ol style="list-style-type: none"> 1. Wetland formation 2. Macro/micro fauna Affects 3. Glacial history 4. Climatic Conditions 	<ol style="list-style-type: none"> 1. Flooding and fire 2. Animal populations 3. Acid Rain 4. Chemical weathering

BUILDING A SOIL RUBRIC

	4	3	2	1
Soil construction	Appropriate materials were selected and creatively modified in ways that made them even better.	Appropriate materials were selected and there was an attempt at creative modification to make them even better.	Appropriate materials were selected.	Inappropriate materials were selected and contributed to a product that performed poorly.
Data collection	Data taken several times in a careful, reliable manner. Accurate measurements were determined for two soil textures and all soil components	Data taken twice in a careful, reliable manner. Accurate measurements were determined for two soil textures and most soil components.	Data taken once in a careful, reliable manner. Most accurate measurements were determined for two soil textures and some soil components.	Data taken once in an inaccurate manner. Inaccurate measurements obtained for all soil textures & components.
Care taken in construction	Textural classification is accurately determined by correct particle size.	Textural classification is mostly accurate for particle size.	Textural classification is somewhat accurate for particle size.	Textural classification is mostly inaccurate for particle size.
Team Collaboration	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.
Total Score				

DECONSTRUCTING A SOIL

	4	3	2	1
Soil deconstruction	Soil particles were completely separated and appropriately identified as sand, silt, clay or other material.	Soil particles were mostly completely separated and appropriately identified as sand, silt, clay or other material.	Soil particles were somewhat separated and appropriately identified as sand, silt, clay or other material.	Soil particles were inaccurately separated and inappropriately identified as sand, silt, clay or other material.
measurement	Data taken several times in a careful, reliable manner and proportions accurately determined.	Data taken two times in a careful, reliable manner and proportions mostly accurately determined.	Data taken one time in a careful, reliable manner and proportions somewhat accurately determined.	Data taken one time is inaccurate and unreliable and proportions inaccurately determined.
Data interpretation	Student relates measurements to correct textural classification for all soil samples.	Student relates measurements to mostly correct textural classification for all soil samples.	Student relates measurements to some correct textural classification for some soil samples.	Student relates measurements to incorrect textural classification for most soil samples.
Team collaboration	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.
Total Score				