Lesson Plans are provided to help organize an existing curriculum, allowing the teacher to spend more time on hands-on activities that meet key classroom learning objectives and improve student achievement. The Lesson Plans will aid the teacher in integrating LaMotte test kits and equipment into classroom activities that meet National Science Education Standards.
**Concept/Topic**
Introduction to soil texture and demonstration of a simple test procedure to determine soil texture.

**Time Requirements**
one class/lab period

**Subject Area(s)**
Environmental Science, Biology, Earth Science, Physics

**General Goals**
1. The students will gain a basic understanding of soil texture.

**Specific Objectives:**

1. Students will be able to list the three types of mineral particles that form soil.
2. Students will be able to explain the importance of having an optimum soil texture.
3. Students will be able to hypothesize on why this test method works.
4. Students will be able to follow instructions and work together as a team.
5. Students will be able to make observations.
6. Students will be able to collect and analyze data, and draw a conclusion.

**Materials, Required**

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5966</td>
<td>Classroom Studies, Soil Texture Lab, Code</td>
</tr>
<tr>
<td>2-2146</td>
<td>Safety Goggles</td>
</tr>
<tr>
<td>2-2234</td>
<td>Gloves</td>
</tr>
<tr>
<td></td>
<td>Timer/clock</td>
</tr>
</tbody>
</table>
Materials, Optional

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Soil Samples</td>
</tr>
<tr>
<td>1067</td>
<td>Soil Texture Unit</td>
</tr>
<tr>
<td>5425</td>
<td>Topsoil Tour</td>
</tr>
<tr>
<td>5913</td>
<td>Nitty Gritty Soil Science Kit</td>
</tr>
</tbody>
</table>

Anticipatory Set (Lead-In):
The soil that covers the surface of the Earth has taken millions of years to create. It is the natural covering of the Earth and supports most plant life. Soil is created when rocks and vegetation are broken down into tiny pieces by natural forces in a process called weathering.

Soil is a mixture of many things but the majority of them are mineral particles. The mineral particles that form the soil are determined by the composition of the rocks that were broken down. The size and amount of the particles affects how easily both water and air can pass through the soil and reach the roots of plants.

Sand particles are the largest. Silt particles are smaller than sand particles, and clay particles are the smallest.

Besides mineral particles, soil texture is also influenced by the amount of decomposed organic matter that the soil contains. Bacteria, fungi, protozoa, small animals, earthworms and ants live in the soil and break down organic matter into nutrients that are used by plants.

Preparation:
Read the manual to become familiar with the text and test procedures. Prepare and package a set of items for each of the 5 teams. Decide how to divide the students into 5 teams. Make a copy of the Student Procedures for each team.
Step-By-Step Procedures:

1. Divide students into 5 groups.
2. Present the Introduction lecture material.
3. Pass out a set of bagged items to each team.
4. Have members of each team decide on the duties of each member. For example, instruction reader, reagent adder, mixer, timekeeper, result recorder etc.
5. Read instructions aloud, one step at time, as students perform the Determining Soil Texture procedure.
6. Discuss students' results.

Plan for Independent Practice:
Have students review additional information on soil on websites included in the Resources section. Have students read and become familiar with Student Procedures.

Closure (Reflect Anticipatory Set):
The ratio and size of mineral particles determines the characteristics of soil. Large sand particles create air spaces between the particles and water passes quickly through the soil. Smaller silt particles allow water to pass more slowly. Plant roots can absorb water that remains longer in the soil. Clay particles are the smallest. Soils with some clay particles are able to store water and nutrients that can be used by growing plants over time. Soils with large amounts of clay can be heavy and dense, making it difficult for water and plant roots to push through the soil. The extremes of texture are not suitable for most uses and a soil with a medium texture in most suitable for plant growth. Soil texture is an important factor in determining the suitability of a land area for planting a garden, growing a crop or construction.
Assessment Based on Objectives:
Have students:
- list the three types of mineral particles found in soil.
- explain how sand, silt and clay affect water retention and plant root growth.
- explain how the test method is based on particle size.
- explain how particle size affects the movement of water and nutrients through the soil.

Adaptations (For Students With Learning Disabilities):
- Provide written and verbal instructions for test procedures.
- Provide a copy of lecture material.
- Give students a copy of the Student Procedures ahead of time so they may become familiar with the instructions.

Extensions (For Gifted Students):
- Have students research the Soil Texture Triangle.
- Have students follow suggestions in the manual for Additional Experiments.
- Have students use terms in the Glossary to create a soil texture crossword puzzle.
- Have students explain how soil texture can determine land use.

Possible Connections To Other Subjects:
- Social studies - land use and urbanization

Resources:
<table>
<thead>
<tr>
<th>Literature</th>
<th>Methods</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Gardening Association <a href="http://www.ars.usda.gov/is/kids/soil/soilintro.htm">www.ars.usda.gov/is/kids/soil/soilintro.htm</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
National Science Content Standards Addressed

A  Science as Inquiry
   All students should develop:
   • Abilities necessary to do scientific inquiry
   • Understanding about scientific inquiry

B  Physical Science
   All students should develop understanding of:
   • Properties and changes in matter

C  Life Science
   All students should develop understanding of:
   • Population and ecosystems

D  Earth & Space Science
   All students should develop:
   • Structure of the Earth system

E  Science and Technology
   All students should develop understanding of:
   • Abilities of technological design

Resources
©2003 LaMotte Company • 3.20.03 • 5966-LP