Background

This short investigation introduces soil science and is meant to follow the 10-minute Score 4 presentation, "It's Not Just Dirt." The lesson is geared towards the information needed when planning a garden, conservation landscape, or rain garden.

Students will define properties of the three types of mineral particles in soils: sand, silt, and clay. These minerals differ in size and composition. Sand has the largest particles; silt has much smaller ones; clay particles are so small they must be seen with a powerful electron microscope. Soils have different *textures* according to the proportions of sand, silt, or clay particles in the soil.

Students will determine the textural characteristics of sand, clay, and silt (sample answers on page 2; directions on the student activity page).

Students will discover that:

- Sand has a gritty feel and will not adhere together as a ball when squeezed.
- Silt (if available) feels smooth, like powder.
- Moist clay sticks together, is malleable, and does not feel silky smooth or gritty.

The students will use this information to determine whether soil samples from the school grounds are sand, clay, silt, or a mixture of the minerals.

Standards:
MD State Curriculum: 2.0 Earth/Space Science
Next Generation Science Standards: 5-ESS3-1, MS-ESS3-3, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4.

Skills Exercised: Observation, data collection, critical thinking – making inferences from data

Grades: 3-12. Teachers should demonstrate the procedure beforehand. Grades 6-12 can do the procedure in teams. Soil activities that are more complex can be used with higher grades as a follow-on activity. See Resources.

Lab Time: 20 minutes

Materials:

1 tablespoon of each soil sample per student or team (enough to fill a student's palm):

- ___ Sand (can be purchased)
- ___ Silt (can be purchased or obtained by allowing it to settle — see soil experiment in a jar.)
- ___ Clay (can be purchased at craft stores)
- ___ School soil from the top 1-4 inches of soil
- ___ Spray bottle of water or dropper
- ___ Paper towels
- ___ Containers for each soil sample

Answers to Texture Test Chart

Using your soil sample, answer the following questions. Put the answer in the column for your sample.	Sand	Clay	Silt	School Soil
a. Can you form a ball?	*Yes*	*Yes*	*No*	*Yes*
b. Does it stay a ball when squeezed?	*No*	*Yes*	*No*	*Yes*
c. Can you form a ball and then roll the ball into a snake?	*No*	*Yes*	*No*	*Yes*
d. Can you form a ring with the snake shape?	*No*	*Yes*	*No*	*No*
e. Does your sample feel gritty?	*Yes*	*No*	*No*	*Yes*
f. Does your sample feel like flour or powder?	*No*	*No*	*Yes*	*No*
g. Does your sample feel neither gritty nor smooth?	*No*	*No*	*No*	*No*
h. What color is the sample?	*Beige*	*Gray*	*Gray*	*Reddish brown*

The school soil above could be characterized as sandy clay. Other investigations, such as the flow diagram (see resources) could make a more definitive determination.

Resources:

- Flow diagram for Texture by Feel. This simple sediment diagnostic is commonly used in the field. This version is provided by the USDA Natural Conservation Resources Service. (Click here for a high-resolution version of the graphic.)
- Soil Science Society of America provides an excellent bank of soils lessons for multiple grades covering texture, biology, chemistry, forensics, and more. http://www.soils4teachers.org/lessons-and-activities#General9 . See their Texture Lesson.

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