

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

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LESSON 32

How Soil Particles Settle

Unit:
ENVIRONMENTAL SCIENCE

PRECEPTS

H. Social Growth

H1. Acknowledge differences exist among people



NATIONAL STANDARDS

NS.K-4.1 Science as Inquiry

Lesson Type:
Large Group

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

1. Conduct investigation of soil particles.
2. Discuss the main types of soil.
3. Observe the settlement of particles within a soil sample.





TIME

Instruction time for this lesson: **50 minutes.**



RESOURCES

None



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ clean 1-quart jar with lid
- ✓ masking tape
- ✓ medium-textured soil
- ✓ water
- ✓ measuring teaspoon
- ✓ non-foamy detergent
- ✓ ruler
- ✓ edible “dirt” materials – vanilla pudding (water), gummy worms (animals), Oreo Sandwich Cookies (rocks), candy sprinkles (minerals), marshmallows (air pockets) and Reese’s Pieces (organic matter)
- ✓ clear plastic cups
- ✓ spoons



KEY TERMS

The following terms are presented in this lesson and appear in ***bold italics***:

soil particles

clay

silt

sand

INTEREST APPROACH

In this interest approach, you are going to try to peak the students’ curiosity by having them create their own version of “dirt.” You will need to have all of the ingredients laid out ahead of time, and have what each ingredient stands for written on the board/writing surface.



How many of you ate dirt as a small child? Really, it is OK to be honest. I know you all did. Well, on the rare occasion that there might be someone here today who did not, this is your lucky day. Each one of you is going to “eat dirt!” Yes ladies and gentlemen, I did say *eat dirt*. As you can see, I have quite an arrangement of food. Each item of food on the table represents a part of the soil. You are going to have the responsibility of creating your own soil mixture. When I say JOE DIRT, each one of you will create your soil. Try to think of actual soil and have your mixture be as ideal as possible. I will be asking each one of you to explain why you made the choices you did in your soil. Have fun and no food fights!

JOE DIRT!

- Edible dirt materials – vanilla pudding (water), gummy worms (animals), Oreo Sandwich Cookies (rocks), candy sprinkles (minerals), marshmallows (air pockets), Reese’s Pieces (organic matter), clear plastic cups and spoons



You guys created some very original “dirt.” Way to go! Now I am going to call on several of you to share the properties of your creation.

Allow students to share their reasoning for putting things together they way they did.



For many of you, each creation had different properties than the person next to you. The differences may have come in the form of layering or even in your soil’s make-up. That is very similar to the property differences in soil. If we think about the variations each one of us may have had in our “dirt,” it shows just how each one of us is different from the other. The properties that make up each and every one of us make us different from the person next to us. Some of us are really good at athletics and some are good at putting stuff together. Soil is the same way. Certain types of soil are better at doing some jobs than others.

Soil’s physical properties describe the sizes of soil particles, how these particles stick together, how stable the soil is and if it can be used for agriculture or particular types of construction. In turn, soil’s physical properties control the ability of soils to hold water and heat.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Conduct investigation of soil particles.



It is going to be important to actually start the “Who put sand in my jar?” activity fairly early on in the lesson, so the soil will have time to begin settling while you are explaining the vocabulary.

We are going to actually create a tool that will help us to see the different ingredients or types of dirt, except we are going to call our dirt “soil.” This activity is going to take a little while because we are going to try to make the parts of our soil separate out. So let’s go ahead and get started.

Help your PALS measure the jar and use masking tape to mark half-full and three-fourths full levels. Have your PALS fill the jar half full with soil, then add enough water to make the jar three-fourths full. Help your PALS measure and add the teaspoon of non-foamy detergent. Remove the masking tape markings.



Shake the jar well for five minutes. Set the jar aside and allow the soil to settle undisturbed. It will show results best if you leave it for about 24 hours.

OBJECTIVE 2. | Discuss the main types of soil particles.



Since we changed from using the term dirt and started using soil, what do you think the word soil means?

Allow students time to share answers.

I. **Soil Particles**

- a. **Soil particle**, which is what we want to see in our tool, is a very small solid piece of soil from the ground.



It is important to know there are three main types of particles we want to look for. The three types are sand, silt and clay.

II. **Sand**

1. A type of soil particle that is fairly large and can be seen or felt very easily.
2. It feels gritty and is 1mm in size.
3. Sand will be at the bottom of the jar.

III. *Silt*

1. A type of soil particle that is much smaller than sand at .05mm in size.
2. It feels smooth to the touch and will hold together when it gets wet.
3. Silt will be in the middle part of the jar.

IV. *Clay*



1. A type of soil particle that is VERY small since it is less than .002 mm in size.
2. It will feel slippery or sticky when wet.
3. Clay will be the top layer in our jar.

OBJECTIVE 3. | Observe the settlement of particles within a soil sample.



The jars will need more time to completely settle and separate out (in the time frame of about 24 hours), but you should be able to see some separation occurring. Ask students guiding questions to lead them through knowing and understanding what it is they are looking at. Have your PALS look at the soil and tell you what he or she sees, as the soil should be separating into layers. Explain that the different kinds of particles were all mixed together in the soil before. Now they are divided into layers by particle type. Have your PALS measure the depth of each soil particle layer. Compare the amounts of each kind of particle.



Our jars still need about 24 hours to completely separate out all of the soil particles, but let's see what is happening so far.



What do we see happening in the jars?

What layer is going to the bottom of the jar?

What layer are we going to see in the middle of the jar?

What layer is going to be on the very top?

REVIEW / SUMMARY



The questions will help the students remember what they just learned with the settlement of the soil particles. For a review, ask the students why they think the particles are going to separate out the way they will. This will allow them to make connections tomorrow once the jar is completely settled and the particles are no longer floating together.



Since we know the different particles are going to separate with sand at the bottom, silt in the middle and clay at the top, let's think for a moment why that happens. Why is sand going to fall all the way down to the bottom of the jar? *Allow students to share ideas, but you are looking for the terms size and texture.* Since sand is so much bigger than the other two particles, it weighs a lot more and therefore will have to sink to the bottom. The reasons for silt and clay to fall where they do is the exact same. Each particle is not just a different size, but also a different weight. The particles all have different ways they are able to hold on to water also. Which particle do you think is going to hold the most water? *Allow for answers, but share with them that clay will hold the most water; if that answer is not given.* Clay is so small and so fine; it really likes to combine with water. It is for that reason we are able to make clay pots. Clay is easy to mold and shape because once it is paired with water, it sticks together and doesn't want to separate. Silt falls right in between. It will hold water better than sand but can't stick together as well as clay.

APPLICATION



Small Group Suggestion: *Lead students on a nature walk and look for areas with certain types of soil. While you're at it, have students guess why one area might have one type of soil and another might have a different type.*



One-on-One Suggestion: *Collect a variety of soil samples from different areas. Conduct the same activity and have your PAL draw and compare the different soil layers.*