**7th Grade Soils Class Lesson Plan**

**What is the difference between dirt and soil? Dirt is what gets on your clothes and under your fingernails. Soil is the surface layer of the earth or the ground beneath your feet. Or to simplify—\*\*\*\*dirt is under your fingernails and soil is under your feet.\*\*\*\***

**Why is it important to conserve our soil? Do the earth as an apple demonstration (first attachment- 1 page on pink paper)**

**Read secrets buried under the ground (second attachment – 2 pages on brown paper)**

**Show 3rd attachment (pie chart showing composition of soil). \*\*\*\*Half of soil is air and water. The other half is broken rock, decaying plants and decaying animals.\*\*\*\***

**SOIL HORIZONS**

**Show attachment 4 the ideal soil profile horizons. Soil is made up of distinct layers, called horizons. Each layer has its own characteristics that make it different from all of the other layers. These characteristics play a very important role in what the soil is used for and why it is important.**

**O HORIZON- This is the top layer of soil that is made up of living and decomposed materials like leaves, plants, and bugs. This layer is very thin and is usually pretty dark.**

**A HORIZON- This is the layer that we call "topsoil" and it is located just below the O Horizon. This layer is made up of minerals and decomposed organic matter and it is also very dark in color. This is the layer that many plants roots grow in.**

**B HORIZON- This is the layer that we call "subsoil" and it is located just below the A Horizon. This layer has clay and mineral deposits and less organic materials than the layers above it. This layer is also lighter in color than the layers above it.**

**C HORIZON- This is the layer that we call "regolith" and it is located just below the B Horizon. This layer is made up of slightly unbroken rock and only a little bit of organic material is found here. Plant roots are not found in this layer.**

**R HORIZON – This is the layer we call bedrock.**

**SOIL PARTICLE SIZES**

**Attachment 5 shows chart with piece of gravel, sand, silt and clay. Soil comes in 3 sizes—large, medium and small or sand, silt and clay Show 2nd comparison salt, sugar and flour containers. Salt can be compared with sand-size soil particles. Sugar can be compared with silt-sized soil particles and flour can be compared with clay-size particles. As a matter of fact, about 50 million clay size particles can fit into a grain of sand. That is one small particle!**

**Now let’s talk about pore space. Ask for a classroom volunteer to come stand next to you for a demonstration. We are going to demonstrate to you the pore space between the different particle sizes of soil. Both you and student stand next to each other with your arms stretched out so your fingertips touch. Sand particles have a large pore space between them, so water can flow quickly through sand. The problem here is that not much water is absorbed. Now you and student will but your hand on your hip so your elbows touch. Silt particles have a little less pore space between them than the sand so water does not pass nearly as quickly through the pores and more water can be absorbed. Now you and student will stand shoulder to shoulder with no space between you. Clay particles are close together, so water does not move quickly here at all. As a matter of fact, clay tends to become water-logged. Student can have a seat now.**

**SOIL TEXTURE**

**Show Attachment 6 soil textural triangle. Soil is generally a combination of all 3 particle sizes. Scientist use a soil textural triangle to determine the type of soil based on the percentage of sand, silt and clay. \*\*\*\*A loam is the best type of soil for growing plants. It has just the right mixture of sand, silt and clay for water movement and absorption.\*\*\*\* Use your finger to follow the lines on the textural triangle for the loam in the yellow box. So you see here that a loam is about 20 percent clay, 40 percent sand and 40 percent silt.**

**SOIL COLOR**

**Show attachment 7 soil color sheet and Munsell Soil Color Charts book. Red, brown, yellow, yellowish-red, grayish-brown, and pale red are all good descriptive colors of soil, but not very exact. The color of soil is determined by minerals and the environment.**

**HIDDEN LIFE OF SOILS**

**As we stated earlier in our brief overview of soil, a handful of healthy soil has more living organisms in it than there are people living on planet earth. The majority of these organisms are bacteria, and again, not all bacteria is bad. Antibiotics, antifungal, anticancer and antidepressant medications are made from soil bacteria. Also, these bacteria keep the soil balanced by regulating pH and decomposing leaves, twigs and other organic matter. Let’s take a look at a 3-minute Youtube video which explains the role of bacteria in the soil:**

**THE LIVING SOIL: HOW UNSEEN MICROBES AFFECT THE FOOD WE EAT**

[**https://www.youtube.com/watch?v=-dhdUoK7s2s**](https://www.youtube.com/watch?v=-dhdUoK7s2s)

 **About 25 percent of all animal and plant species that scientists have identified live or spend much of their lives in the soil. Our knowledge about these organisms is still limited because they live in a dark opaque environment and most of them are too small to be visible to the naked eye. A large portion of these species have not yet been described and named by specialists so who knows what is actually living in the ground beneath our feet? It’s a mystery!**

**Scientists generally classify organisms that live in the soil by their size. Go over Microflora, fauna and organism sheet**

**Show mesofauna sheet, macrofauna sheet and megafauna sheet.**

**Show the Soil Community Biorama which has megafauna critters. Read a few excerpts from the Soil Community Biorama book—especially #11, the carrion beetle.**

**SOIL FOOD WEB**

**All these organisms are part of the soil food web which serves as a digestive system for plants. Show “The Soil Stomach” attachment.**

**Here is an image of the Soil Food Web. Show Soil Food Web attachment and read the trophic levels at the bottom of the attachment. Nematodes are included in the second, third and fourth trophic level. Some nematodes are root feeders, some eat fungi and bacteria and some eat other nematodes. Remember nematodes are microorganisms, the smallest soil organisms. Scientists know what they eat based on the shape of their mouth.**

**Let’s take a look at another of Youtube video to help explain the complex soil food web: (Video is 7 minutes long)**

**59 Degrees Academy: The Soil Food Web**

<https://www.youtube.com/watch?v=ZcAmpVJgwJI&t=27s>

**THE HIDDEN LIFE OF SOILS CARD GAME**

**For the remainder of the class, you get to play cards. We will divide up into groups of 4 and play a game similar to “Go Fish” except you are trying to collect all 6 cards within 7 different families related to the soil. Here are the rules: Go over 7 Happy Families Playing Rules attachment.**