

## Summer Camps 2020

# SOIL SCIENTIST CAMP

Kendall County Outdoor Education Center \* [www.kcoutdoored.org](http://www.kcoutdoored.org) \* [dbazan@roe24.org](mailto:dbazan@roe24.org)

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What is the difference between SOIL and DIRT? Dirt is the stuff that gets under your fingernails and must be washed off your hands before you eat. Soil is a living entity that grows the food we eat. Soil is full of life. It is often said that a teaspoon of soil has more living organisms than there are people on planet Earth. Soils are the stomach of the earth, consuming, digesting, and cycling nutrients and organisms.



Soil may seem lifeless, something on which we walk, build roads, construct buildings, and grow plants. Look closer and observe that soil is teeming with life. Living organisms present in soil include bacteria, fungi, algae, protozoa, and a wide variety of larger soil creatures, including springtails, mites, roundworms, earthworms, ants, insects that spend all or part of their life underground, and larger organisms such as burrowing rodents. All of these are important in making up the environment we call soil and in bringing about numerous transformations that are vitally important to life.

<https://www.soils4teachers.org/biology-life-soil> Soil microorganisms not only nourish and protect plants, but they also provide “ecosystem services” critical to human survival. In fact, you may argue that soil is Earth’s most valuable ecosystem. It provides water filtration to help keep our water bodies clean. Soil also helps to regulate climate through the carbon cycle.

## Activity #1: MAKING MUD

**Materials:** bare soil on the ground, 32 ounces of water, stir stick

Find a spot in your yard that has some bare soil where you can make mud. How much water will it take? Does the soil become mud as soon as it gets wet? Will you have to stir it up? Start by using your hands to loosen some of the soil. Now slowly add water, a little at a time. Is it mud yet? Stir it with the stick, or better yet, use your hands. How does it feel? Continue to add water and see how the mud changes. It may be sticky and firm, like clay. What can you build with it? If you add enough water, it may be like paint. Are you brave enough to step in it with your bare feet? Let the mud squish between your toes. Think of some words to describe how it will feel. Finally, try adding other materials to your mud. You can add grass, dry leaves, pine needles, or even shredded newspaper.

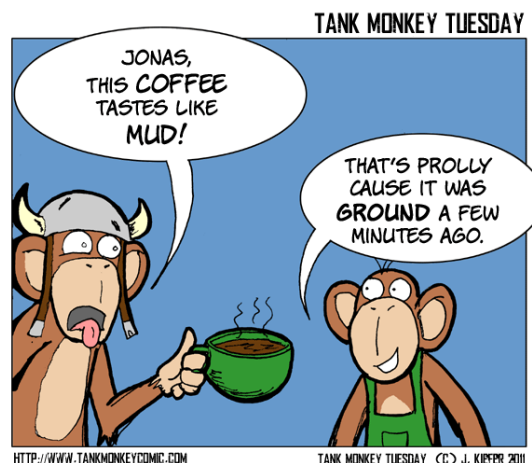
Once you are done playing in your mud puddle, make a prediction. How long do you think it will take for your mud to become dry soil again? Mark down the time and check it every few hours. How is it changing? Continue to chart the changes until you see it return to the way you first found it.

We have a mud pit dug at the KCOEC, and you are welcome to come “make mud” at our center!

Have you ever heard the expression “clear as mud”? What do you think it means?

What did the soil in the garden say during a heavy rain? If this keeps up, I’ll be MUD!

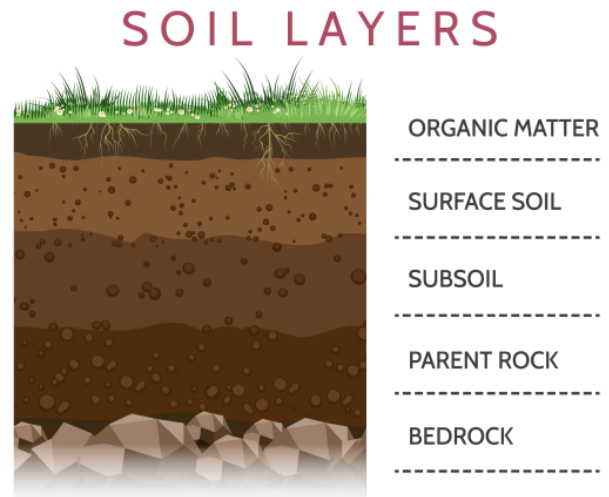
What mud jokes can you think of?



## Activity #2: DIG A HOLE

**Materials:** Garden spade, Yardstick

Find a parent-approved location in your yard to dig a hole. Cut out a block of soil by pushing the spade all the way down into the soil on all 4 sides. As carefully as you can, remove the block of soil and try to keep it in tact. This way you can examine the layers. Does it look like the picture here? Using your yardstick, measure the thickness of each layer of soil.



The top layer of soil, Organic Matter (O horizon), is usually less than an inch thick. This layer of soil is made up of decomposed plant and animal materials and provides nutrients. Can you identify anything in this layer that is not completely decomposed yet? (Dead bugs, cut grass, leaves, root pieces)

Topsoil (Surface Soil, A horizon) comes next and contains plant roots, bacteria, fungi, small bugs and worms. Plants need this layer to survive. The soil is dark in color and rich in nutrients from all the things that decayed in the first layer.

Subsoil (B horizon) is the middle layer of soil and is lighter in color. You won't find as many organisms here. Plants have a harder time growing in this layer of soil.

Finally, the last two layers are the parent material for the soil (C horizon). This is the lowest layer and has less living matter. It is called the parent material because it is the weathered rock and soil from which the layers above were formed.

### Activity #3: SOIL PARTICLES

**Materials:** clear jars/bottles with lids, water, various soil samples

Soil is made of different sized particles called sand, silt and clay. Sand is the largest and heaviest particle, and it helps water to move freely through soil. Silt particles are medium sized and let some water pass through while still holding some water in the soil. Clay particles are the smallest particles and are so fine that water is often unable to move through the clay. Soils are made of a combination of these combinations.

Begin by collecting soil samples from different places such as your yard, a garden, a wooded area, an exposed area like a construction site, or soil from near water. Place each sample in a clear container (not more than half full). Fill the container about 2/3 full of water, put the lid on tightly, and shake it up well to mix all the soil and water. Then let the jars sit still and watch the particles settle out of the water. Let the jars sit for about an hour, and you will see the different soil particles separated out in layers. How are your soil samples different?

## SOIL PARTICLES

### SAND

Largest  
Can be seen with the naked eye



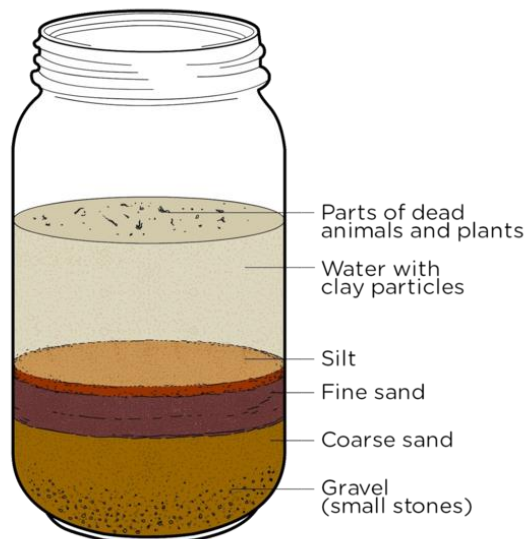
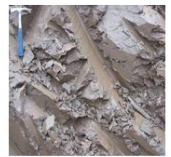
### SILT

1/20<sup>th</sup> of a millimeter in diameter or less  
Loose, fine grayish-brown powder



### CLAY

Very fine sized  
Formed during weathering



## Activity #4: SOIL EROSION

**Materials:** container of soil, watering can, inclined plane (ramp), collection tray

Erosion is the wearing away of soil by wind and water, and it is a big problem. As you learned, we have a limited amount of nutrient rich topsoil for growing our foods. Imagine Earth as an apple, and the skin of the apple is our topsoil. It is a thin layer, isn't it? Earth has lost about half of its topsoil in the last 150 years due to erosion. <https://www.worldwildlife.org/threats/soil-erosion-and-degradation>

It takes over 100 years for nature to produce an inch of topsoil, so you can see that soil is a threatened resource. Try this experiment to see if you can slow down erosion.

Set your container of soil on the inclined plane. Gently sprinkle water from a watering can onto the soil and observe what is collected in the collection tray. How much soil moved with the water? This is erosion.



Now try covering the soil container with leaves, sticks and grass clippings. Sprinkle with water and observe the erosion. Does the soil move more or less this time? Finally, try putting a piece of sod or moss on top of the container of soil before sprinkling it with water. How does erosion look now?



This experiment is set up at the KCOEC at Hoover. Come and try it for yourself!

## Activity #5: VERMICOMPOSTING

**Materials:** plastic tub, shredded newspaper, drill, window screening, plant mister with water, yard soil, red wiggler worms

Worm composting, or vermicomposting, is a good way to make nutrient rich soil to add to your garden and houseplants. In addition to producing compost, it's also a great way to put those kitchen scraps to use.

It is easy to get started. You can buy a kit, or you can use a plastic storage bin with holes drilled in the sides. A 10-gallon bin is a good size to start with. Drill  $\frac{1}{2}$  inch holes in the sides of the bin and lid, so the worms can breathe. You can cover the holes with window screening if you are worried about them escaping. Use hot glue to attach a strip of screening over the holes on the inside of the tub.



You will need to start with some bedding material. The bedding should be a nontoxic material that holds moisture and still allows air to circulate. Some materials that can be used include newspaper (make sure to not use glossy paper), shredded office paper, paper bags, cardboard or decaying leaves. If using paper, tear it into half-inch-wide strips. Fluff the paper up and fill the bin halfway, and wet it down by misting it with some water. Remember that the worms will eat the bedding, so more will have to be added over time. Keep the bedding moist. Finally, add a handful of soil to the newspaper because this will introduce microorganisms that will aid in the composting process.

Now you are ready to add your red wiggler worms. These are the best worms for composting because they are surface feeders unlike earthworms that burrow deep in the soil. A 10-gallon bin can easily accommodate a pound (about 1000) worms. In a healthy bin, the worms will reproduce so you will end up with more. Your worms will consume about 2 pounds of food scraps each week. They will want to eat almost any fruit or vegetable waste (no citrus). They will eat crushed egg shells, too. Do not put meat or dairy into your compost bin; the worms will not eat that food, and then it will rot, smell and attract bugs. When you add your food scraps, use a trowel to open up the soil so you can bury the scraps at the bottom of your bin. Be sure to keep soil and food scraps covered in shredded paper. Your bin can stay indoors so it is easy to use. The worms cannot be left outside in the cold or they will freeze and die.

## **ADDITIONAL RESOURCES**

SOIL ON EARTH: This simple “Earth as an Apple” experiment shows just how much soil is on the earth for growing plants and our food. There are plenty of You Tube videos on this as well.

<https://canolaeatwell.com/earth-as-an-apple/>

PEBBLES, SAND AND SILT: Here’s a soil erosion experiment to conduct; then compare to soil erosion in the prairie. What’s the difference? <https://betterlesson.com/lesson/637334/water-erosion>

WORMS: This interactive presentation uses a comical worm to answer questions about worms and soils. Provided by the U.S. Department of Agriculture Natural Resource Conservation Service

[https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?&cid=nrcs143\\_021958](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?&cid=nrcs143_021958)

VERMICOMPOSTING: This site explains how to build a worm bin and harvest the soils.

<https://extension.illinois.edu/blogs/good-growing/2019-01-22-composting-worms>