



**3<sup>RD</sup> GRADE**  
**STEAM LESSON**



# GETTING DIRTY

## Driving Question:

How does human development of communities affect soil development and composition?

## Materials Needed:

Sketchbook, writing utensil, glass jars with lids, labels removed, several soil samples from around your community, water, rulers

## In this lesson, students will:

- explore and record how soils are formed by weathering of rock and the decomposition of plant and animal remains;
- collect data about materials found in multiple soil samples;
- summarize a data set with multiple categories using a frequency table, dot plot, pictograph or bar graph;
- identify and compare how people in different communities adapt to or modify the physical environment in which they live; and
- create a painting using soil as a medium.

## TEKS:

Science: 3.7(A)

Math: 3.8(A)

Social Studies: 3.4(B)

Art: 3.1(B); 3.2(C); 3.3(A)



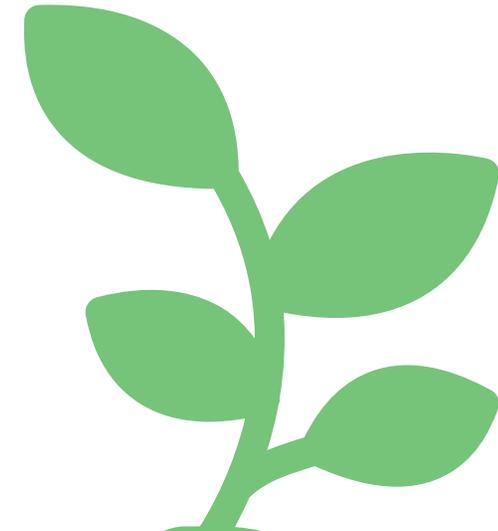
# SPINNING THE COCOON

Begin the lesson by having students brainstorm with a partner everything they know about soil. Have students discuss where their background knowledge comes from. As a class, generate a thinking map of ideas discussed with their partners.

Next, view this [video](#) on soil formation so students have a basic understanding of the process. After watching the video, have students work with a partner to create a flowchart in their notebooks about the process of soil formation. Then have each set of partners form a group with another set of partners and share their flowchart with each other. Have them discuss the similarities and differences they find.

Review key vocabulary before continuing with the exploration.

- **Soil** is a loose mixture of rock fragments, organic matter, water and air that can support plant growth.
- **Sediment** is the different types and sizes of rock material in soil.
- **Humus** is the decaying organic material from plants and animals that helps to create the soil mixture.



## KERNEL OF KNOWLEDGE

It takes [500 to 1,000](#) years to create an inch of soil! Why so long? Soil is generally derived from rock, which has to be broken down by weathering and physical processes that take years and years to undergo.



# METAMORPHOSIS

Now it is time to explore and determine the composition of soil samples in your community. Divide students into small groups. The class will need a variety of soil samples to test. These samples can be collected ahead of time by the teacher or you can have students bring in soil samples from around the community or school. Each group will need one glass jar with a lid and a soil sample.

Students will fill their jar halfway with soil then fill the remainder of the jar with water. Once filled, students need to put the lid on tight and shake the jar vigorously. Jars should be labeled with group names and set somewhere they can remain untouched for two days. This activity will cause the soil to divide into soil layers, with the humus/organic material at the top, followed by the topsoil, subsoil, and finally any rock at the bottom.

When returning to the samples students should gently move them to a table where they can be observed. Each group should draw their sample in their notebooks and measure each layer they observe. Tell them to color and label each layer. Then students should create a table to collect data and compare all the group samples. This table should have group names on one axis and layers on the other axis. Next, each group can take turns observing all the samples and adding to their data table the measurements of the other soil layers by group. Students should write a summary of the data they collected in their notebooks. In a class discussion, summarize how the different soil samples from the community compare.

Ask the class these questions: What do the layers of soil samples tell us about our community? How might humans impact soil samples? (Some answers might include, how old the city/town is, how many people live there, what type of industries are in the area, etc.)

Now have students use computers to research any new developments in their communities. Have them list any new neighborhoods, business or community areas such as parks or nature preserves that are being created. If there is no new development in your community, have them create a plan for new development. Next, have each group create an image of a soil sample they might find in the areas of development. Ask, "How might they be the same or different as the current soil sample?" Combine groups and have each group justify their new created soil sample based on their development findings or creation.

As a wrap-up, have each student write in their notebooks a summary of the activity and the findings of their group. Be sure to have them write about the impact humans will have on soil formation in areas of development and form an opinion of whether the development is helpful or harmful for the the environment.

## UPCYCLE

Students have observed the layers of soil and learned how soil is formed. Humus, or organic material, is a key component of the mixture of fertile soil. First, students should look at a development map of their community, which can be found on the county or city website. Next, they should identify which areas will have the greatest impact on humus or natural decaying material. Then, they will work in groups to determine how this will affect the quality of the soil formation in that area. Students should evaluate the benefits and risks to soil development.

Next, students can create a public service announcement video about human development in their community and how it is affecting their natural environment and soil development to inform the community. Videos can be shot using a camera, smart phone or tablet and edited with free software programs like iMovie.



## eARTh

Soil can be useful in a number of ways, including as a medium to make art! Before starting the project, talk with your students about cave paintings. These are some of the earliest forms of artwork known to man, and date back as far as 64,000 years ago. Many people, including Native Americans, use soil as an Earth-friendly medium to create art, for both decoration and as a form of communication. Some of the oldest cave paintings are found in modern-day France in what are known as the Lascaux caves. Visit this [site](#) with your students to see examples of these cave paintings and learn the history behind these extraordinary works.

Now that you have learned some of the history behind using soil as a medium, it's time to make some soil paint of your own! You will need to following materials to make your paint:

- Various soil samples
- Metal sieve
- Elmer's glue
- Water
- Small paper cups
- Popsicle sticks (or other stirring utensils)
- Paint brushes
- Thick paper (copy paper it is too thin; watercolor paper or some type of multimedia paper will work best).

Have the students collect various soil samples from around the school, or put a small portion of the samples that they gathered for the previous activity in separate plastic baggies. Make sure that the soil is completely dry before beginning. Sift the samples using the metal sieve to eliminate large lumps, rocks, etc. Put the sifted soil into paper cups, divided by type. Each type of soil will likely yield a different shade/color of paint.

Now, mix Elmer's glue with a little water to form a runny paste. Add small amounts of this mixture to your soil samples until you have the consistency of paint. You can experiment with different consistencies. Thicker mixtures will be similar to using a tempera paint, while thinner versions will be more like watercolor. Once the students have created their paints, they can get started on their paintings. This would be a great project to work on creating different tones/shades as well as textures. Once they have finished, have the students discuss their art and the similarities and differences they experienced painting with soil as opposed to synthetic paints.

### Community Garden

- As a class, research composting and how it benefits the environment and the community. Create a composter to turn food waste from the school cafeteria into compost for area gardens, or create a garden at your school! Visit this [website](#) for helpful tips on how to create a composter.



## THROUGH THE LENS

Have students use a smartphone or other recording device to document the amount of cafeteria waste that could be used for composting. Create a documentary to show your principal to persuade them to allow students to create a composter at school.



## CAREER CONNECTION

**Geologist** - A geologist is a scientist that studies physical properties of the Earth, including rocks and soil. A bachelor's degree is usually required, and advanced degrees are needed for more specialized positions.

**Surveyor** - A surveyor inspects land to determine its condition and value. Their evaluations are important to planning for human development. Most employers require a bachelor's degree in surveying, mapping or geomatics (a branch of science that deals with the collection, analysis and interpretation of data relating to the Earth's surface).



## CAREER HIGHLIGHT

Dr. Sue Carstairs is the executive and medical director of the [Ontario Turtle Conservation Centre](#) in Peterborough, Ontario. She is an authorized wildlife custodian with more than 20 years of experience in wildlife medicine. Dr. Carstairs and her team help hundreds of injured turtles each year. Many of these turtles have been hit by cars and boats or impacted by other human development. Her work is highlighted in the film, *Fix and Release*, which was shown at EarthxFilm2018.

