

## Connecting Math to Our Lives and Communities

### What's in Your Soil?

#### Introduction:

Soil is an important part in our everyday lives, as it holds water and nutrients and is a key ecosystem for millions of organisms. It is also important to know the make-up of your soil as it can help determine the strengths and weaknesses when it comes to gardening. Soil is made up of clay, which is high in nutrients and holds moisture; sand, which drains water quickly and doesn't hold nutrients as well as clay but maintains much more heat; and silt, which has properties of both clay and sand, but not as extreme.

Currently, climate change is having a great impact on agriculture and gardening, but it is also impacting Mi'kmaq traditions. A local canoe maker, Todd Labrador, from Kespukwitk uses birch trees for bark, medicine and wood and says Mother Nature is changing. There has always been a challenge finding bark due to deforestation and now young trees are dying from the top down. This is most likely due to a phenomenon called *dieback*, which is a gradual death from tree branches or plant shoots that spread from the tips inward to the trunk or stem. Before, once you open up the bark, it used to be wet with sap and it would peel off easily. Now, due to climate change, the bark is extremely dry and you need to pry the bark off of the trees. Seasons are also getting mixed up, as all the signs are coming in about a month late. This is affecting the canoe making tradition and risks that not all of the knowledge will be able to be passed down because traditions are adapting to stay alive.

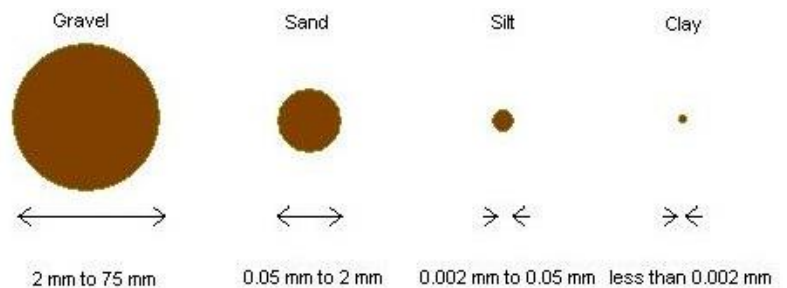
To look into Todd Labrador's story further, visit our CMTOLC website to find a CBC article.

#### Math Connections:

- Measurements
- Proportions
- Ratios
- Percentages
- Fractions
- Decimals

#### Materials:

- Mason jar and lid
- Infographic
- Ruler or other measuring device
- Soil (from your garden or yard if possible)
- Water



## Activity:

For this activity, you will be testing to see what different types of particles (sand, silt, or clay) are in your soil. You will be calculating the percentages of each different soil type based off of your sample.

- 1) You will take your glass jar and fill it up half-way with soil, and the remaining half with water. Be sure to leave roughly an 2cm of air at the top of the jar.
- 2) Put the lid on the glass jar and shake the jar vigorously until all the clumps of the soil are broken down.
- 3) Let the jar sit undisturbed overnight. This is very important because it will let the particles settle to the bottom of the jar.

Think about it: What percentages of each different type of soil do you predict there will be? Use the “Identify Your Soil Type” infographic to help with your predictions.

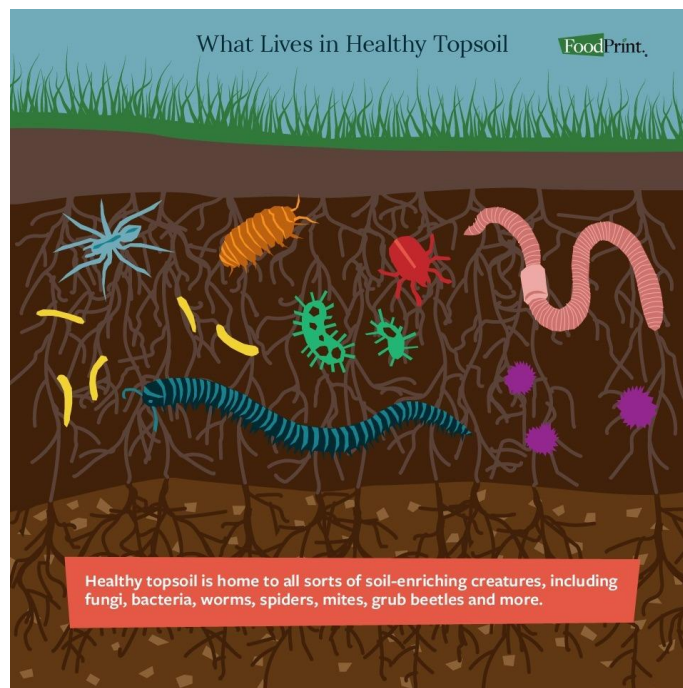
Clay:

Silt:

Sand:

- 4) Once the layers have formed measure using a ruler, or other measuring device, the height of each layer. It is important to measure the total height of the layers, not including the water, to determine your percentages.

Think about it: Why not include the water in your measurement?



**Questions:**

What are the percentages or proportions of each layer? Draw them out!

Clay:

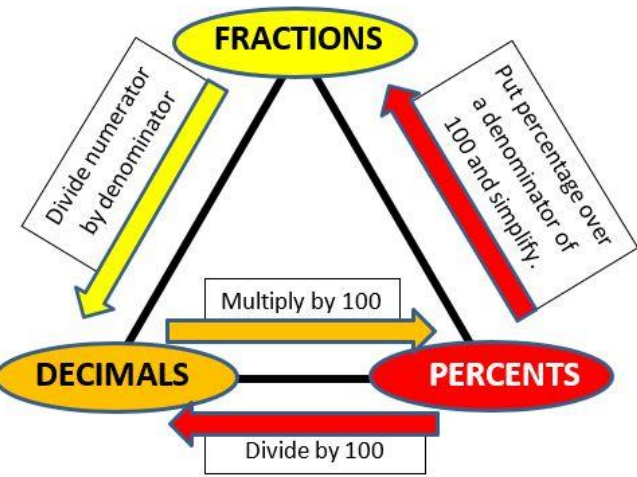
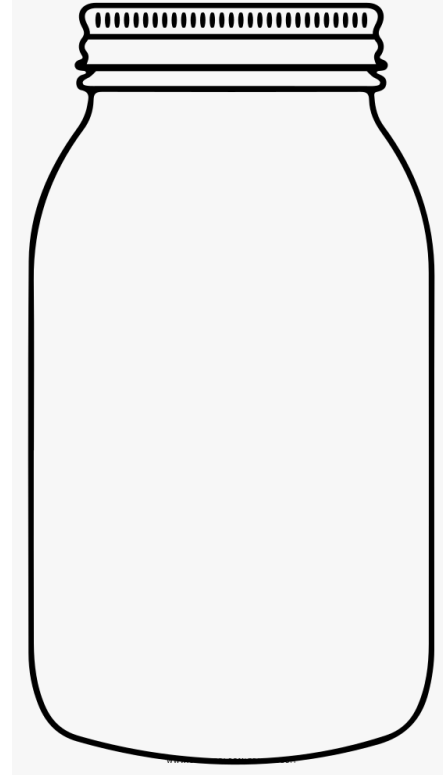
Silt:

Sand:

Were your earlier predictions correct? How close are they to the ideal soil (30% clay, 40% silt, 30% sand)?

If you add all of the percentages together, what do you get?

In this case could we surpass 100%? Can we ever surpass 100%?



Can you change your percentages to decimals? What do the decimals add up to?

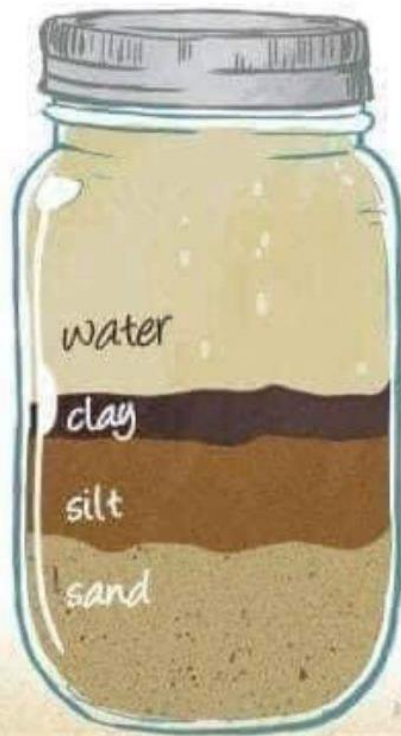
Can you change your percentages to fractions? What do the fractions add up to?

What was the order in which the soil settled? Why? Will this occur every time?

**Send us a photo of your soil jar at Connecting Math to Our Lives and Communities email ([cmtolcstfx@gmail.com](mailto:cmtolcstfx@gmail.com))! ☺**

# IDENTIFY YOUR SOIL TYPE

## the jar test

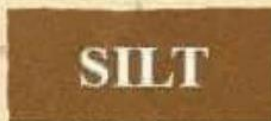


- 1 Fill a clear glass jar halfway with your soil sample.
- 2 Fill the remaining half with water, leaving 1" of air.
- 3 Attach lid, then shake the jar vigorously until you have broken up any clumps of soil.
- 4 Set the jar aside to rest, undisturbed, overnight.

After 24 hours your jar's contents will have settled into distinct layers:



SAND



SILT



CLAY

By examining the proportions of these layers, you can gain a sense of what type of soil you have, and what you need to add to improve your soil. Here are some examples to use for comparison. The middle jar is ideal soil:



25% clay  
25% silt  
50% sand



30% clay  
40% silt  
30% sand



50% clay  
25% silt  
25% sand