Settle that Soil!

**Background**
Soil is made up of minerals (from rocks), air, water, and organic material (dead plants and animals). Soil is one of the major things plants need to survive: it has the nutrients and water plants need to grow. Soil is formed by the breakdown of rocks. These rocks can either be very far down below the soil, called bedrock, or from rocks hundreds of miles away that breakdown and are carried away by wind and water. Some of Hawaii’s soil is from the Gobi Desert in China!

Sand particles in soil are .05-2mm in size and are the heaviest. If a soil has a lot of sand, there is a lot of open space and air and this soil cannot hold a lot of water. Soils near beaches and the ocean have a lot of sand.

Silt particles are .002-.05 mm in size and is often blown away by winds because it is lighter than sand. Soils with a lot of silt can be very muddy.

Clay particles are smaller than .002 mm and there is very little air space in soils with a lot of clay. When clay is dry it as hard as concrete, and water may pool on top of clay because it can’t be absorbed because of the lack of space between particles.

**Pre-lab Questions**
1. What is soil?

2. What are some things you can find in soil?

3. Why is it important that soil has different particle sizes?
4. Circle which has the biggest particle size:
   a. Sand
   b. Silt
   c. Clay

5. Circle which has the smallest particle size:
   a. Sand
   b. Silt
   c. Clay

6. Can plants survive in soils that have a lot of clay? Why or why not?

7. Which (sand, silt, or clay) do you think will fall to the bottom first?

**Objective**
By observing the different layers of your soil samples, you will be able to determine how much sand, silt, and clay there is in the soil of a garden, your school yard, and your neighborhood.

**Safety**
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.

**Procedure**
1. Label each jar with where the soil sample came from.
   a. One jar per sample
2. Fill the jar half way with soil.
3. Fill the rest of the jar with tap water (almost to the top).
4. Put the lid on the jar – *make sure it is on tight* (get your teacher to double check!)
5. Shake the jar vigorously for a full minute (You can take turns so that everyone in your group gets a chance).
6. Record your observations one minute after you’re done shaking, 5 minutes after, 30 minutes after, etc. in the table below. Be sure to look for multiple layers of soil in your jar!
   a. Use your stopwatch for the one minute observation.
   b. Have one member in your group be the timekeeper and write down what time you need to check your jar to record your other observations.
Observations

<table>
<thead>
<tr>
<th>Which layers do you see after:</th>
<th>Soil 1</th>
<th>Soil 2</th>
<th>Soil 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 minute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 minutes</td>
<td></td>
<td></td>
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<td>30 minutes</td>
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<tr>
<td>1 hour</td>
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<td></td>
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<tr>
<td>24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis
1. Was there a noticeable difference in the number of layers after 5 minutes compared to after 1 minute? Why or why not?

2. Was there a noticeable difference in the number of layers between 12 hours and 24 hours?

3. Can you clearly see the separate layers of sand, silt, and clay?

4. Which soil sample had the most sand?

5. Which soil sample had the most clay?

6. Which soil sample had the most silt?
**Conclusion**

What did you learn about soil that you did not know previously? Do you think it is important to know how much sand, silt, or clay is in the soil? Who may benefit from knowing the type of soil in the ground?