**4th Grade STEM Lesson**

Standard 3: Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs of plants provided by soil.

Objective 3: Observe the basic components of soil and relate the components to plant growth.

a. Observe and list the components of soil (i.e., minerals, rocks, air, water, living and dead organisms) and distinguish between the living, nonliving, and once living components of soil.

b. Diagram or model a soil profile showing topsoil, subsoil, and bedrock, and how the layers differ in composition.

**Title: Shake It Up**

**Description:** Students will shake a soil sample in water to observe and measure soil layers. They will use estimation and fractional thinking to report their observations.

**Time Needed:** 30 minutes

**Materials:** small jars (jelly, tall baby food) with a good lid, soil samples with a mixture of materials (sand, clay (might be kitty litter), gravel, top soil), water, rulers

**Procedures:**

1. Collect materials and add the soil to the jars. The jars should be about ¾ full.
2. Add water to cups but do not mix yet. There should be enough water to cover the soil and have some left on top.
3. Hand out the student sheet to the students and have them write as instructed.
4. Ask students to gather the materials and add the water to the jar.
5. Remind students to carefully close the jar.
6. Students will shake the jar until it is entirely mixed and follow the directions on their student sheet.
7. Clean up can be accomplished by having students return the jars to you. You can dry the soil for next year or use the same jars and shake them before giving them to the students (so they do not see the results right away)

Student Sheet Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Title: Shake it Up**

**Introduction:** Do you know that soil has parts? Do you know their names? In this activity you will separate soil into its parts and see how much of each part (or fraction) there is.

|  |  |
| --- | --- |
| **What are the soil parts?** | **What fraction of the soil is this part?****(make a prediction)** |
| 1. |  |
| 2. |  |
| 3. |  |
| 4. |  |

**Directions:**

1. Get the soil and water and ruler as your teacher directs. What parts of the soil can you see now?
2. Add the water and lid to the jar. Shake gently at first to make sure it doesn’t leak. Let the jar sit for 5 minutes. Draw what it looks like at first, then after waiting.

 After shaking After settling for 5 minutes

1. Take your ruler and measure the thickness of each layer. Write down the thickness in the table:

|  |  |  |
| --- | --- | --- |
| **Soil parts** | **What is the thickness of the soil?** | **What fraction of the soil is this part? Estimate.** |
| 1. |  |  |
| 2. |  |  |
| 3. |  |  |
| 4. |  |  |
| All the soil |  |  |

1. Which layer(s) did you guess correctly?
2. Why do the fractions need to add up to 1?
3. A soil profile has these layers: bedrock, subsoil and topsoil. Draw a soil profile below where the bedrock is ½ of the thickness, subsoil is ¼ and topsoil is ¼:

8. Why might a farmer be worried if the thickness of topsoil on the farm went from ¼ to 1/12 of the soil profile?