SOIL BULK DENSITY: FIELD WORKSHEET

W-S-07

Name:_____

Class:_____

Date:_____

CHECK OFF EACH STEP AS YOU ACCOMPLISH IT

1. Site Name: _____ Site Location:_____

2. **BEFORE LEAVING FOR THE SITE:**

   a) ___ Mark each container with a unique ID. Take the volume of your container by filling it with water and pouring it into the graduated cylinder. Remember to measure at the meniscus! Record the volume of each container on the table on the last page.

   b) ___ Use the hammer and nail to poke a small hole in the center of the bottom of each sample container.

   c) ___ Weigh each container on your scale, and record the mass on the table.

AT THE SITE:

___ 3. Expose your study site by removing all vegetation and scraping off the top layer of soil to uncover a fresh layer.

___ 4. Using the trowel, begin digging downward into the soil. Attempt to keep the sides of the hole as vertical as possible. This will reduce incidents of collapse. The hole should be wide enough to reach your arm down with the container. We suggest starting with a diameter of 1 foot as the hole will inevitably narrow as it gets deeper.

___ 5. Continue digging until you see a marked change in soil texture, color, moisture, or composition. This means you have reached the second soil horizon and have thus completely exposed the first.

___ 6. Place the container against the side of the hole and press it into the soil. The puncture you placed in the bottom of the container will allow air to escape. You will know the container is full when soil starts coming out of the puncture hole.

   a) If the soil is too hard and you are unable to press the container into the soil, lightly tap the hammer against the edges.

___ 7. Smooth off any irregular clumps from the top of the sample to create a flat face.

___ 8. Use the meter stick to measure the depth of the sample. Record it on the table. Also record the horizon number of your sample.

___ 9. Take 2 additional samples at this horizon.

___ 10. Continue digging until the second horizon is fully exposed. Repeat the sampling procedure (Steps 5-7).

___ 11. Repeat for as many horizons as feasible, until the hole starts collapsing and samples are impossible to take.

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BACK IN THE CLASSROOM:

___ 12.Wait until your samples have dried. The simplest way to achieve this is to set the samples on a windowsill in your classroom. Check daily if the samples are dry. Unless your samples were quite moist, 48 hours should be plenty.

___ 13. Weigh the samples on the scale, and record the mass on the table provided. Calculate sample mass:

Sample Mass = Total Mass-Container Mass

*Where total mass is the mass you're taking right now, and container mass is the weight of the container you recorded for question 2c. Record Total Mass and Sample Mass on the table.

___ 14. Pour the sample through the sieve, collecting the throughput soil on the paper plate. Use your hand to *lightly* brush back and forth on the top of the sieve to break apart clumps push soil through. DO NOT FORCE IT! Rocks larger than 2mm will remain on top of the sieve.

___ 15. Weigh the rocks on the scale and record the mass.

___ 16. **Take the volume of the rocks**: fill the graduated cylinder to a predetermined amount (say 20 ml), and gently drop the rocks into the cylinder. The difference between this final reading and the initial reading is the volume of the rocks. Remember to measure at the meniscus! Record rock volume on the table.

___ 17. Calculate **Bulk Density = (Sample Mass-Rock Mass)/(Sample Volume-Rock Volume).**

Since the object of this activity is to determine how tightly packed the soil is, this calculation alters the typical density equation (D = M/V) to account for the contributions made by the rocks.

___ 18. Are your data reasonable? Typically, soil densities can vary between 0.5 and 2 g/cm^3. Do your data fall in this range? If not, what do you think is the reason?

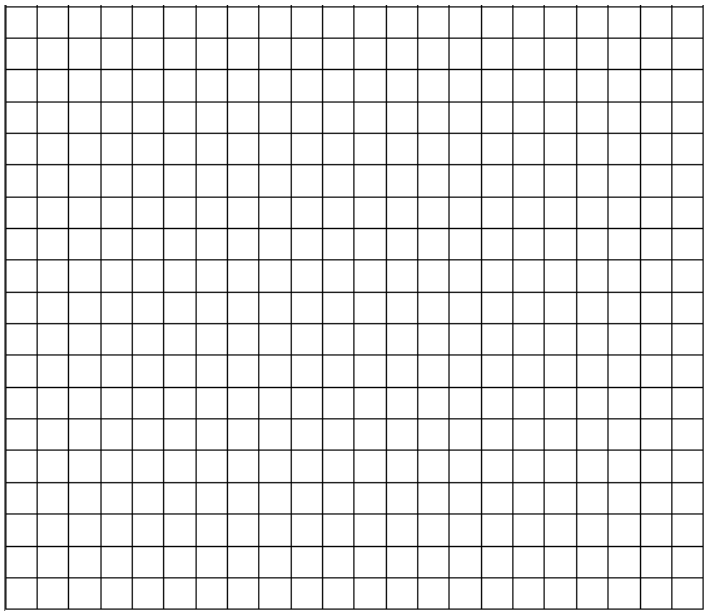
___ 19. How dense is your soil? Lower density soils are around 0.5 g/cm^3 and very dense soils are around 2 g/cm^3, with "average" soils resting around 1.3 g/cm^3.

Name:_____

Date:_____

20. How much did rocks contribute to your soil's original mass? Did this vary amongst horizons? On the graph below, plot each horizon's average Rock Mass as a line graph, with mass on the Y-axis and Horizon Number on the X-axis. Then, plot the average Sample Mass for each horizon, again as a line graph.

Title:_____



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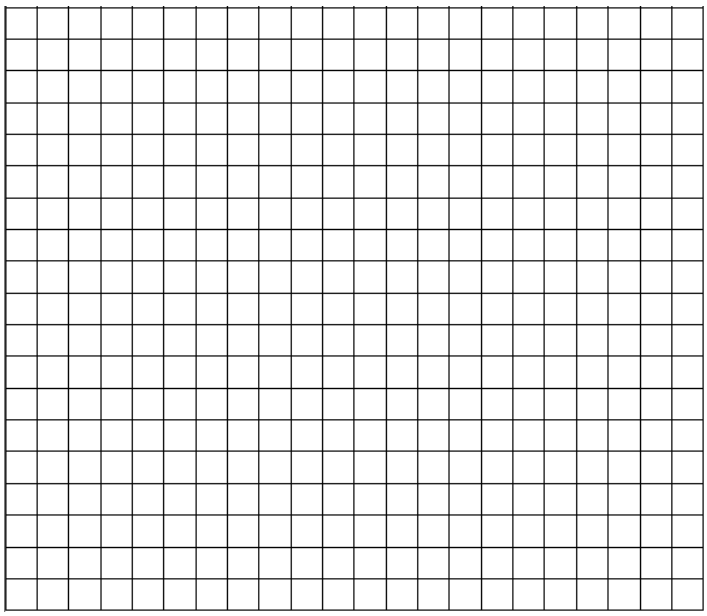
20. How much did rocks contribute to your soil's original <u>volume</u>? Did this vary amongst horizons? On the graph below, plot each horizon's average Rock Volume as a line graph, with mass on the Y-axis and Horizon Number on the X-axis. Then, plot the average Sample Volume for each horizon, again as a line graph.

Title:_____



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21. Which factor of density (mass or volume) did the rocks affect most?

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Name:_____

Site:_____ Location:_____ Date:_____

Container/ Sample ID	Container Mass (g)	Container Volume (cm^3)	Horizon #	Sample Depth (cm)	Total Mass	Sample Mass	Rock Mass	Rock Volume	Bulk Density