SOIL MOISTURE: FIELD WORKSHEET

W-S-06

Name:_____

Class:_____

Date:_____

1. Site Name: _____ Site Location:_____

2. **BEFORE LEAVING FOR THE SITE:** Mark each sample container with a unique ID. Weigh the sample container and record the mass on the table on the last page.

3. At the site, find where you would are going to take your samples. If you are investigating a transect, you will be taking samples every 5 meters along a 50 meter line. If you are sampling a single site, you will be sampling at different depths.

4**. For transects:**

a) Using the rope, spray-paint, or surveyors flags to mark the transect of study. It should be about 50 meters long. To add scientific merit, we suggest that the transect begin at an area of some interest that could potentially affect soil moisture, such as the bottom of a slope, the bank of a river, or a marked change in vegetation, and extend away from that area.

b) Mark sites every 5 m along the transect. These will be your sample sites. At each site, scrape off the top layer of debris and remove any vegetation.

c) Using the trowel, dig down to 5 cm, and take a 100 g sample (about palm-sized). Remove any organisms and visible pebbles, and place the sample in the container. Seal the container tightly to prevent water loss. Label the container with the sample ID.

d) Repeat with each sample site along the transect. You should end with 11 samples, assuming you included both endpoints.

e) Be sure to record field notes for each sample: note Sample ID, time of sample, location and depth on the table on the last page.

5. **For depth studies:**

a) Use the trowels to scrape off the top layer of debris to expose fresh soil. Also remove any vegetation.

b) Use the trowel to scoop about 100 g of soil into a container. Be sure to label the container with the site name and depth. Remove all visible organisms and pebbles. Seal the container tightly to prevent water loss. This is your 0-5cm sample.

c) Use the trowel to dig deeper, removing all soil to an area OUTSIDE the sample hole, to prevent soil from the top reaching samples lower down.

d) Use the meter stick to measure your hole. When you have reached 10 cm, take another sample and place it in the container. Remember to mark the container with the sample information and seal the lid tightly.

e) Repeat for 20 cm, 30 cm, 40 cm and 50 cm. Because of the primitive nature of taking samples with trowels (as opposed to an auger, which are cumbersome and not ideal for school projects), your may be unable to dig further due to soil collapse. If, however, you are willing and able, you can take samples in 10 or 20 cm increments up to 1 m.

f) Be sure to record field notes for each sample: note time of sample and depth on the table on the last page.

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1. **Measure Wet Mass:**

   a) Place your sample (still on the container, but without the lid) and record its mass.

   b) Subtract the container mass from the above value to get wet mass.

   c) Repeat with every sample.

2. **Measure Dry Mass**

   Option 1: Remove the lids from the samples and leave them in a secure location to dry over at least 2 days.

   Feel the soil occasionally to determine if it is dry enough to measure. Once it is, place the container on the scale. Subtract the container weight from the result and record the dry mass on the table.

   Option 2: Place the samples in the microwave for 3 minutes on the defrost setting. Take the sample out and weigh it.

   For the best data, you will want to ensure that the soil is as dry as possible. To do this objectively, weigh the sample after the initial drying in the microwave, then microwave it again for 1 minute, and weigh again. Repeat this until you get consistent results for at least 3 iterations. Subtract the container mass from this result to get dry mass.

3. **Calculate the water percentage in the soil.**

   a) For each sample, subtract the dry mass from the wet mass. This gives you the mass of the water that was in the soil. Record this on the table.

   Wet Mass - Dry Mass = Water Mass

   b) Take the mass of the water you calculated in part (a) and divide it by the wet mass. Multiply this by 100 and you get the percent water in the original sample. Record this on the table.

   (Water Mass / Wet Mass) x 100% = % Water

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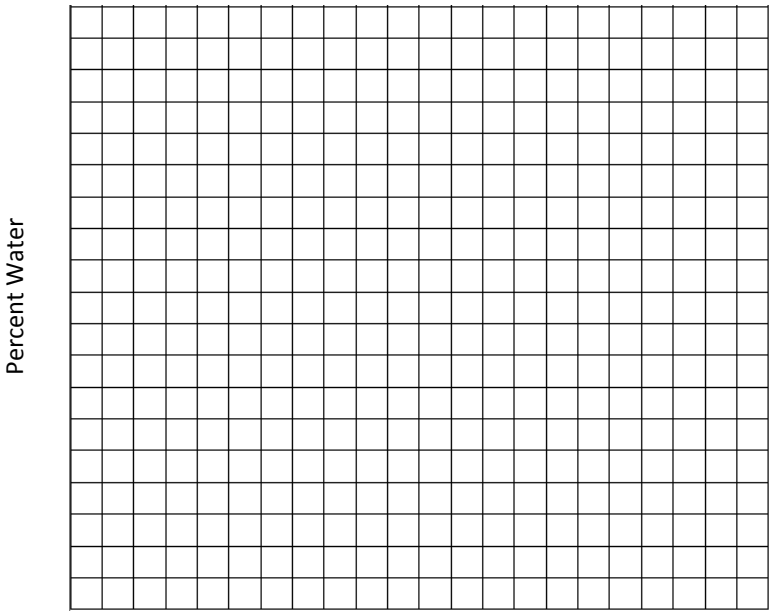
4. Use the graph provided to make a line graph of the percent water over your sample site. If you used a transect, your x-axis should be "distance from origin." If you studied depth, the x-axis should be depth of sample. What trends do you see in your data. Does moisture change with distance (or depth) or does it remain the same. Why do you think this is?

Title:_____



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5. We are now going to use a statistical tool called a T-test to determine if the wet mass samples and the dry mass samples are different.

a) Go to: http://www.graphpad.com/quickcalcs/ttest1/. Here, you will enter your data on the spreadsheet provided.

b) Enter "Wet Mass" for the title of Group 1, and "Dry Mass" for the title of Group 2. Enter all of your results for wet mass in column 1 and dry mass in column 2.

c) Click the option for "Paired t-test" and select "Calculate now." This will lead you to a results page.

d) What is the mean of the wet mass data?_____

e) What is the mean of the dry mass data? _____

f) What is the p-value of the relationship? _____
(This can be found at the top of the results page)

g) P-values tell you the nature of a relationship in the data. If the p-value is < .05, the two groups are significantly different from one another. Is the wet mass significantly different than dry mass?

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Name:_____

Site:_____ Location:_____ Date:_____

Container/ Sample ID	Container Mass (g)	Time of Sample	Sample Depth (cm)	(if Transect): Distance (m)	Wet Mass (g)	Dry Mass (g)	Water Mass	% Water	Notes