Porosity & Permeability Lab

Define <u>Porosity</u> –

Define <u>Permeability</u> –

Procedure:

1. Set up apparatus so the funnel is over the beaker.
2. Place a coffee filter in the funnel so that solid material does not flow through.
3. Using a beaker, measure 25 mL of soil #1 and place it in the funnel, on top of the filter.
4. Place the beaker underneath the funnel.
5. Using the other graduated cylinder, measure 50 mL of water and slowly pour it into the funnel. Let the water percolate through the soil and collect in the beaker.
6. Begin timing when you have poured the water onto the soil sample, and continue to time until the water has stopped collecting in the beaker. Record the total amount of time for each sample in the corresponding drainage time data slot.
7. Measure the amount of water in the beaker and place this number in the data table under the amount of runoff (measured in mL).
8. Clean apparatus, placing the used soil in the designated area. Then, repeat steps 2-6 for soil samples 2 – 4. Record all data in data table. Be sure to complete the questions.

Soil Type	Drainage Time	Amount of Runoff (mL)	Drainage Rate (amount of water drained/time)	Water Retained (subtract amount of water drained from 50 mL, expressed in %)
Gravel				
Topsoil				
Sand				
Silt				
Clay				

Questions & Analysis

1. The sample that had the highest drainage rate and retained the least amount of water was the most permeable. Which sample does this describe?
2. Why can some soil samples hold more water than others?
3. Compare the permeability of these samples with their porosity. The sample that retained the most amount of water had the highest porosity. Was the most permeable sample the most porous as well?
4. Is there any connection between a soil's permeability and its porosity? <u>Explain.</u>
5. Why are pore spaces in soil important to plants and organisms that live in soil?
6. Which of these samples would you want to use for planting purposes? <u>Why?</u>
7. Which of these samples would you want to place in an area that is known to get sudden bursts of precipitation? (meaning a high amount of water very quickly) <u>Why?</u>
8. Which sample would be most similar to soil you would find here at school? Why do you think this sample best describes GHHS soil?
9. Which sample of soil would you want to build your house on? <u>Why?</u>

Soil Mysteries

A. Two weeks ago, Leticia and Sam received a phone call from a lawyer who told them that Sam's grandfather, who had recently passed away, had willed a piece of land to them. They now own the property and could do with it whatever they wished.

It didn't take long for Sam and Leticia to decide what to do with the land as they had often dreamed of building their own small house. They were both good carpenters and were sure that with some boards and bricks and a lot of work, they could make a fine house for themselves.

When Sam and Leticia went to visit their new property, it seemed as if their dream would come true. They started right away by filing the proper building permits and learned that they would have to have a percolation (perk) test of the site's soil.

When they received the test results, their hearts sank. The soil n the property had failed the perk test, and they would not be able to build their dream house.

10. Why not? What was wrong with the soil? (Your lab today was a perk test of four different soils.)
11. How would this prevent someone from building a house?
12. What alternatives would you suggest to Sam and Leticia instead of building their house on this property?

B. Ahmed has a house on the side of a hill in California. A mudslide destroys his home.
13. What soil conditions caused this to happen?

C. Sun owns an apartment building. The building is getting cracks in the foundation from the soil settling.
14. What soil type would cause this to happen? Why?

D. A flood in Raleigh is blamed on increased runoff.
15. What caused the runoff?