Before starting the lab, sift, sift, sift. We need lots of gravel, sand, silt and clay.

Porosity & Permeability Lab

Warning: KEEP THE BEADS OUT OF THE SINK.
Do not risk both the ire of your professor and janitors or starting an international confrontation which inevitably will lead to a nuclear holocaust.

1. Define porosity.

2. Define permeability.

Part 1 - Determining Porosity
(Which size beads will hold more water between the particles?)

Materials
3 sizes of beads small beaker graduated cylinder funnel 250 ml flask

3. I predict that the _____ (small / large) beads will I hold more water (have greater porosity) because _____

A. Using the funnel, gently fill a 250 mL Erlenmeyer flask to the 200mL line w/ small beads. Tap to ensure compaction.
B. Using the graduated cylinder, pour water over the bead until they are just covered.
C. Record the water required. Mind the meniscus.
D. Record results below and on the white board.

mL of Water Required to Cover 100 mL of Beads

	Small	Medium	Big	Mixed
	82	76	90	75
	82	74		
AVERAGE	82	75		

E. Put all your equipment away.

4. The small beads are most like _____ (clay/sand/silt/gravel) and the large beads are most like _____ (clay/sand/silt/gravel)

5. Based on my results which type of rock, siltstone or a well sorted conglomerate is the most permeable?

6. Why do you think this is so?

7. Which would be most porous, gravel, sand, or clay? Why?

Part 2 - Measuring Permeability

Materials

sediment cup	500 ml Erlenmeyer	250 mL Erlenmeyer	graduated cylinder
sediment	ruler	timer (phone)	

8. Which sediment, clay, silt, sand, gravel, or mixed do you predict will be most permeable, small, medium or large?

9. Why?

F. Obtain the equipment shown in the drawing. Don't get the sediment yet.

G. Cut out a piece of paper towel to fit in the soil cup.

H. Moisten the paper towel.

I. Place the paper towel in the bottom of the soil cup.

J. Obtain your sediment - either clay, silt, small sand, large sand, gravel, or a mixture

K. Fill the soil cup with your sediment 1 cm from the top. Really - 1 cm.

L. Tap. Refill as needed.

M. Use the graduated cylinder to pour 200 mL of water into the 250 mL Erlenmeyer.

N. Record the time that it takes for water to flow through your sediment here and on the board. ___ seconds.

Time to Drain in Seconds

Clay 400 Silt - 360 Sand - 35 Gravel - 116 Mixed 210

10. According to our results, which sediment was most permeable?

11. Why do you think this is so?

12. Which was least permeable?

13. Why do you think this is so?

Summary Questions

14. How are the beads like real life sedimentary clastic (conglomerate) rocks?

15. In which type of material, sandstone or shale, would you want to establish a well? Why?

16. With which type of material, gravel, sand or clay, would you want to line a toxic waste dump, so that water wouldn't carry the nasty stuff back into your drinking water? Why?

17. You can buy either of two houses which are in a very rainy area. One is on sandstone and one is on shale. Which will you buy and why?

Write a summary stating two general rules you have proved.

17.

18.