

Soil Model Instructions

Instructors will need to provide soil for the “How Full is Full?” porosity and permeability activity. In general, one type of soil in an appropriate quantity for the activity will be sufficient. The soil will be used by the students in two forms, the first being representative of a natural (non-agricultural) setting (uncompacted) and the second being representative of agricultural soil from intensively farmed land (compacted).

Collection Method: If the instructor has access to a natural soil from an undisturbed area such as a forest floor or a non-farmed field then that soil should be collected. If the only soil available is to be collected from a park (with permission) or landscaped area, the instructor should try to collect the sample from beneath a bush or a tree, where the soil should be more undisturbed and uncompacted. Keep in mind that roots might be an issue, so you may not want to collect the sample too close to the plant. If the only available soil is to be collected from a farmed or compacted area, the instructor should try to loosen the soil. This may take a bit of trial and error, but the goal is to have soil that is less compacted (representing natural, uncompacted soil) so that some of it can be compacted to represent tilled/grazed soil. If your soil is a heavy clay, you may want to mix in a little mulch or peat; however, the advantage of using a clay is that when the clay is compacted it shows a dramatic loss in porosity and permeability and students can't help but see this.

If the instructor absolutely cannot collect a soil sample it can be purchased from a plant nursery or garden center. Care should be taken to purchase the *least* organic-rich, *most* clay-rich soil you can find. The point of this activity is to demonstrate compaction to the students and soil that is very rich in organic matter may not stay compacted as well as a less organic-rich soil will.

Quantity: About 2 cups of soil (or about 500 ml, depending on what you are collecting it in) will be required for each group doing the activity. It will be important to collect extra soil to account for spillage and other losses, so if possible collect twice as much as you have calculated you need.

Preparation of soil samples: Samples should be prepared ahead of time using 4 clear plastic cups for each group of students, 6 oz or larger. Punch numerous holes in the bottom of two cups only using an awl, a corkscrew, or a small drill bit and leave two cups without holes in the bottom. Place a known equal volume of soil (such as 100 ml) in each cup so that the samples are at least 3 or 4 inches high in each cup. The soil in each cup at this point should be either as undisturbed as possible or at a minimum be uncompacted, to represent natural soil. The samples in the cups without holes should be labeled “Sample #1” and “Sample #2. The samples in the cups with holes should be labeled “Sample #3” and “Sample #4. Compact samples #2 and 4 with your hand.