

Activity 29: Constructing a Set of Soil Sieves

Maine Geological Survey



Objectives:

To involve the student in the construction of a reasonably accurate soil sorting device. To demonstrate that accuracy does not ALWAYS have to involve expensive, high technology equipment. To provide several sets of soil sieves for classroom use in the upcoming activities.

Time:

This activity is designed to last 40-80 minutes, depending on outside preparation.

Background:

Soil sieves are a useful tool for separating the coarse sand, fine sand, silt, and clay fractions from a soil sample. The relative proportions of these particle sizes are used to classify soils and give them generic names such as loam, fine sandy loam, silty clay, and so on. Industrial sieve sets are very costly, running easily \$500 a set. [Ben Meadows](#) has a very good plastic version, but this still provides for doing only one sample at a time and makes for very SLOW lab work. For an expenditure of about \$250 one can produce 16 SETS of screen sieves with four sieves to the set. With 16 sets you can have 16 samples and 32 students (hopefully classes aren't quite that large) working at once. The sets can be retained for many years use. The above cost can be lowered considerably depending on local sources of supply.

Materials:

Figure 1 is a photo of some of the starting materials for a set of soil sieves.

You will need one strip (1 foot wide by 4 feet long) of each of the following mesh sizes of stainless steel cloth: #10, #25, #230, and 5 micron.

The Gilson Company Inc. sells polyester and nylon mesh cloth for about \$12/square foot. As they sell this material in square foot units, four sets of sieves could be produced for a cost of under \$200. The polyester/nylon mesh is not as rugged as the stainless steel but should last several years with reasonable use.

You will also need 64 five-inch hose clamps from your local NAPA Auto Parts (or similar) store. Most NAPA dealers will give you a volume discount, especially if they know that this is for an educational project; discounts will vary from dealer to dealer. You will need 64 one-pound coffee cans; it helps considerably if they are all the same size. Enlist student aid in collecting these. Tools needed include: meter stick, magic markers, tin snips or hacksaw, file, can opener, pliers, and a screw driver. Paints, brushes, and stencils are optional.

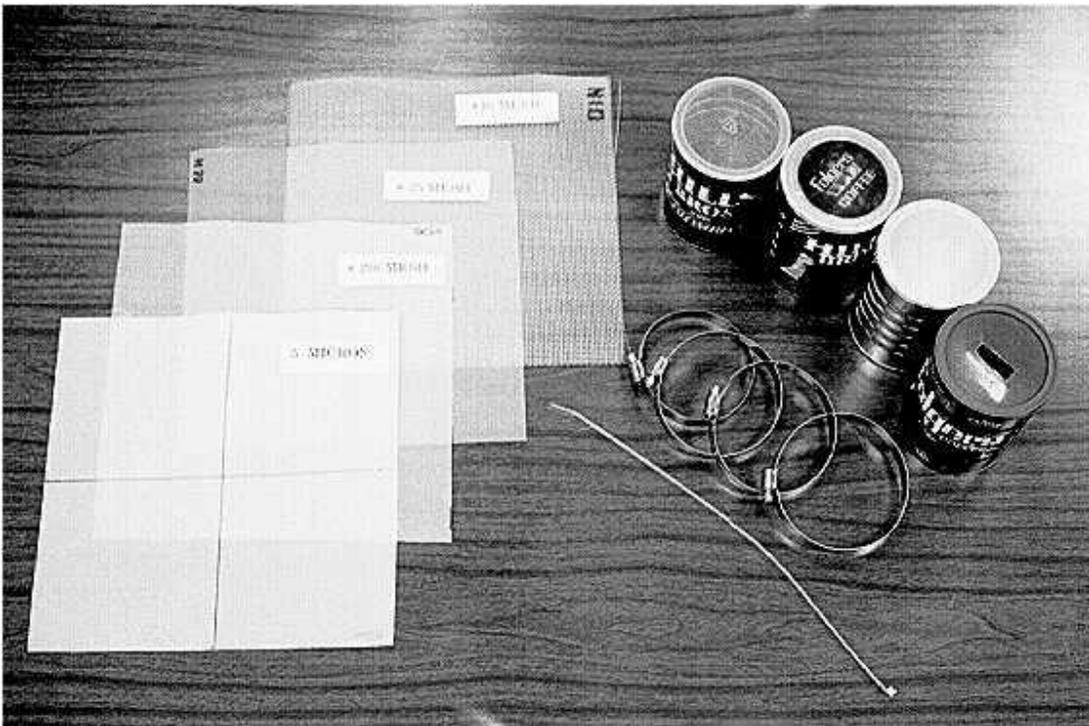


Figure 1. Starting Materials for a set of soil sieves.

Procedure:

Mark off one foot square pieces of screen/cloth into four 6" squares as shown in Figure 1. Cut neatly and evenly along the dotted lines. Take one coffee can, remove both ends, and place the can in the center of one of the 6-inch squares of cloth (can diameter should be just about 4.5 inches). Crimp the cloth up around the ends of the can; this may require snipping the cloth slightly on the larger meshes. Hold the cloth to the can with a five inch hose clamp tightened securely around the base of the can. The clamp should rest just above the metal ridge at the bottom of the can; do NOT over tighten as this will warp the can and make it hard to use. Repeat this process for each mesh size in the set. Divide cans up into sets of four, one of each mesh size per set. Teachers may wish to paint the cans and add numbers to them for easy reference. Subsequent activities using these cans will refer to them as 1, 2, 3, 4 based on the table below.

Number	Mesh Size	Particles Passed	Particles Removed
1	#10	coarse sand	gravel
2	#35	fine sand	coarse sand
3	#230	silt	fine sand
4	5 micron	clay	silt

To use the sieves, place a dry sample in the largest mesh can and shake gently over a tray for several minutes. Put the contents that pass through this mesh into the next smaller meshed sieve and repeat the process. Continue in this fashion until each can contains the materials that will NOT pass through the mesh size and the tray contains the finest of all particles, the clay. Mass and or volume comparisons will give relative percent values for each particle size in the sample. You may wish to retain materials of a given particle size for use in future activities.

Special Safety Procedures:

Care should be used in all cutting activities, especially the removal of coffee can bottoms. A file can dull the open end of the cans.

Follow-Up:

See other soil activities such as:

Activity #28: [Soil Sampling Techniques and Data Sheet](#)

Activity #30: [Composition of Topsoil](#)

Activity #31: [Determining a Soil's Textural Classification](#)

Activity #33: [Soil Horizons](#)

References:

Activity adapted by Duane Leavitt.

Name _____



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Student Sheet

Purpose:

To create and use an accurate soil sorting device.

Materials:

For each set of 4 sieves you will need the following: four (4) pieces of wire or synthetic mesh cloth 6 inches square, 4 five-inch hose clamps, and 4 one-pound coffee cans with plastic snap-on lids. Tools needed will include a meter stick, magic markers, tin snips, file, can opener, pliers, and a screw driver. Paints, brushes, and stencils are optional.

Procedure:

1. If it has not been done already, mark off six inch squares on four pieces of 1 foot square cloth or mesh.
2. Cut off one six inch square from each of the four mesh sizes.
3. Cut the bottoms out of four coffee cans; be certain to dull any sharp edges left on the can with the file.
4. Expand the four hose clamps so they will slide easily over the end of the coffee cans.
5. Place one can in the center of each square of mesh. Pull the mesh tightly up around the sides of the can. It may be necessary to pleat the mesh around the side of the can for a snug fit.

6. Place a hose clamp over the mesh and can, and position the clamp just above the metal ridge on the bottom of the can. Tighten the clamp.
7. Repeat this process with the three remaining sets of materials.
8. When you have completed the above, make certain that you have 4 DIFFERENT sizes of mesh in your sieve set.
9. OPTIONAL. Your teacher may direct you to paint the outside of the cans and/or stencil a number on the sides. If you do this, make certain to not spill any paint onto the mesh.