

“Be an Environmental Engineer”²

Job Task:

You are the engineer! You have been hired by GYSTC Water Supply Company. With the ongoing drought, there is not enough water available for the community. You are given 3 samples of water used to determine use. Sample A is used for humans. Sample B is used by animals. Sample C is used for plant watering. The water company needs all three water types. They will pay you to design filtration methods for each type of use. For every milliliter of water filtered at the Sample A level will get you \$10. For every milliliter of water filtered to the Sample B level will get you \$5. The company is even willing to pay \$1 per milliliter for water filtered at the Sample C level. Using the materials listed below, can you make more from your filtered water than you have to use in the materials it takes to filter the water?

Timeframe: 1 – 2 hours

Materials List:

- 1 liter of water with soil and sand in it until it is thin but relatively opaque
- 3 test tubes prepared with the water standards "A," "B" and "C" (C is filtered through some grass, B is filtered through a coffee filter, and A is filtered through 2 coffee filters with a paper towel in the middle)
- cotton balls
- gauze squares
- tulle/netting
- tissue
- paper towels
- coffee filters
- gravel (aquarium gravel works great)
- sand
- 3 test tubes and rack per student
- graduated cylinder

Procedure:

1. Put trays of materials in front of the students. Let them decide in teams what materials they would like to use to filter their water. To challenge students, include one of the following constraints:
 - a. Limit the amount of materials allowed for the design.
 - b. Assign a price per unit of material and give students a budget to work within.
2. Have students draw schematics of the layers. Once completed, give each team 25 ml of the dirty water to begin to filter in their test tubes.
3. Once filtering is complete, have them bring the test tubes to you for observation. Decide if the water is A, B or C grade and help them measure their sample in a graduated cylinder. They must return to their desks and do the math to come up with their \$ value. Have students put their \$ values on the board.