

## RECYCLING PROPOSAL

### Teaching Guidelines

**Subject:** Mathematics

**Topics:** General Skills, Measurement, Geometry, Fractions, Decimals, Percents, Ratios, Statistics

**Grades:** 6 – 9

#### **Knowledge and Skills:**

- Can solve complex, multi-step problems
- Can determine when not enough information is given and, if appropriate, gather the additional needed data
- Can estimate the linear dimensions of an object with reasonable accuracy
- Can compute the volume of a rectangular prism
- Can compute the volume of a cylinder
- Can perform binary operations with decimal numbers
- Can plan and execute a survey with responses to a set of questions from a set of individuals, and summarize the results using appropriate statistical measures and graphical representations

**Materials:** None

**Procedure:** This project should be done by students working in teams of 3 or 4 students each. You may wish to appoint team leaders.

Distribute the handout and discuss it. Tell each team that they are one of the environmental consulting firms being asked to prepare a proposal for the City Council's consideration.

It is suggested that you ask each team to prepare a draft of its summary letter for your review and approval prior to their presentation to the "City Council".

Be sure to give each team time to measure the garbage produced in their own houses for one week and time to survey the local population. (If you wish to simplify and speed up the activity, you can provide students with numbers for item #2.)

To: Local Environmental Consultants

From: Ray Hoffman, Senior Recycling Planner, Seattle

Your city wishes to develop an effective recycling program similar to the one we have here in Seattle, and would like you to prepare a proposal for getting it done. I have been asked to explain to you what that proposal should include.

- 1) Landfill costs. Assume that the present cost for delivery of one truckload of garbage to your local landfill is \$100.00.

You should estimate how many garbage cans full of trash are equivalent to one truckload, based on the approximate dimensions of garbage trucks you have seen and the dimensions of a typical household garbage can. This will give you an estimate of the cost to the city of delivery of one garbage can full of trash.

In our experience, each person living in a city produces about  $\frac{1}{4}$  of a garbage can's worth of garbage each week.

With this and one other piece of information (which you will need to find somewhere), you should be able to estimate what your city's current landfill costs are.

- 2) Amount of recyclable garbage generated by typical home. I suggest you weigh the garbage produced in your own home for one week to determine this. Be sure to separately measure the weight of glass and plastic, paper, and metal. (I suggest you keep it separate for a week before you weigh it, rather than trying to separate it out at the end of the week, which is a messy job.)

You will also need to determine what volume of recyclable material there is, compared to other garbage. If one third of the garbage is recyclable, then that means only two thirds will go to the landfill. From that you can calculate the amount of money saved in landfill costs.

3) Value of recyclable materials. Metal has an average value of \$.75 per pound. Glass or plastic has an average value of \$.10 per pound. Paper has an average value of \$20.00 per ton.

Note: If the recyclable material is not separated in the home, it will cost the city approximately \$.03 a pound to have it separated.

4) Based on this information, please calculate how much money would be saved by the city if glass, plastic, metal and paper were recycled instead of sent to a landfill, and whether or not the city should require that such materials be separated in the home prior to being picked up.

5) You will need the support of your local population for this program to work, for they must at least be willing to separate out recyclable material from non-recyclable material. I recommend that you survey some local people to determine their attitudes toward recycling, and determine what they would be willing to do and what incentives or fines the city could use to encourage compliance with its new recycling program.

You are to make a proposal to the City Council which presents the information you have collected, your analysis of that information, and your recommendations for how to proceed in getting popular support for this program. Your presentation should be no more than ten minutes long. I suggest you develop visual aids for this to make it more understandable to Council members. In my own experience, good pictures of garbage always have a lot of impact.

You must also summarize your proposal in a 1000 to 1500 word letter to the City Council Chairman.