

ESS 203 *Glaciers and Global Change* Winter 2008
Friday January 18

Writing assignment due on Wednesday January 23:

This 3-part assignment has a different “flavor” from the previous ones. Here I am asking you to use your new knowledge about the Earth, (together with some arithmetic that you learned in elementary school), to estimate how big some things are, or how important some things are. You will probably encounter assessment questions like this in virtually any career.

Remember that I am not grading your answers to these questions; I just want you to flex your mental muscles to think about the Earth this way, and get the best answers that you can.

Difficult as this may be to believe, *Curious Scientists* actually think that figuring out stuff like this is fun. ☺

Geothermal Heat

1. You are going to bid on a contract to sell electricity to Seattle from geothermal energy. Suppose you could capture **all** the energy coming from the Earth's interior, on some land where the geothermal flux is just average, i.e. about 50 mW per square meter. (1000 mW = 1 W).

- How much area (square meters) do you need to collect 50W of power (enough to run a 50W light bulb) from geothermal energy?
- If this area is a square, what is the length of one of its sides?

2. How many light bulbs do you think there might be in Seattle? One way to get a quick estimate would be to think how many people there are in Seattle, and then to estimate how many light bulbs there might be for each person ...

3. Good news! Fortunately, you hold the energy rights on some land near Mount St. Helen's, where the geothermal flux is 100 times the world-average heat flux.

- How much area you would need in order to light a 50W bulb on this “hot” property?
- If this area is a square, what is the length of one of its sides?