**Teacher’s Guide-**

**“That’s Huge- An Exploration of Size and Scale”**

INTRODUCTION:

In this activity, students will investigate the number “1 Billion” in an effort to better grasp how large 1 billion is, and therefore how small “one-billionth” can be. The activity also encourages students to utilize estimation and modeling to develop a procedure to predict values that are too large to actually calculate or count. Students should be familiar with the metric system prior to this activity, as well as the procedure for converting between units in the metric system. This activity is best done in groups of 2-4, but should be adjusted as needed. It could also be assigned as homework if necessary, if students are given sugar cubes or the dimensions of a sugar cube. Another option is to complete part one in groups and have students complete part 2 individually or at home.

TIME: 45 minutes

MATERIALS (Per Group):

* Several Sugar Cubes
* Meter Stick
* Timer or Stopwatch
* “That’s Huge” Student Sheet Lesson 1.2b (1 per student)

PROCEDURE:

1. Break the class into groups of 2-4 students and distribute supplies.
2. Explain that each group will be developing a procedure to estimate the amount of space 1 billion sugar cubes will take up. Students may need reminders about concepts like volume and how to calculate volume of rectangles/cubes.
3. Point out that when finding how much space something large will require, it is necessary to think about logical units for the answer- does it make sense to measure the volume of the Pacific Ocean in cm3?
4. Allow the students to start discussing their procedures, circulating to offer tips and guidance. Students should be allowed to struggle through the process, including making mistakes, realizing on their own (when possible) if the procedures are inaccurate or flawed.
5. Once groups are finished, have them share their estimates on a class data table. Each estimate should be different, allowing for a discussion of uncertainty and percentage error in science
6. After seeing group answers, tell students to write for 5-10 minutes about the activity- how did their group design a procedure? What problems, if any, did they have and how did they address them as a group? How did their final estimate compare to other groups in the class? What are the limitations of their procedure and how might they improve it if given another chance?