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### TI Lesson Plan: Volume Area and Mass

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## RESUBMIT: TI LESSON PLAN

Name: Hakes, Roger

Grade Levels/Subject taught: Grades 9-12, Living Environment

Objectives: To give the students visual models to understand the concept of area, volume, and the ratio of area to volume.

For the Science teacher—Science concept or Key idea:

The key idea to be taught is a comparison of how the increase of surface area of a cube affects the increase of the volume of a cube. With a living cell, if the cell's surface is doubled, the volume is increased by a factor of 2.83. The cell's surface area cannot get enough materials into the cell to enable the cell to function efficiently. Thus the cell cannot survive.

Description of lesson

Using GSP and TI 84 calculator, I plan having my students calculate surface area of a cube and compare it to the cube's volume.

This lesson will be presented early in September, and the teacher will be getting to know the students and their prior knowledge. The teacher will begin by asking the students what a square is, how to find the area of a square, what a cube is, how to find the area of a cube, and how to find the volume of a cube. The results of this inquiry will be put on the board for students to copy into their notebooks.

With this introduction, the lesson will continue using the laptop and the Geometer's Sketch Pad, gsp. Students will volunteer or be selected by the teacher to make one sketch per student of a cube in three dimensions, a cube laid out in two dimensions, and four squares with side lengths of 1 inch, 2 inches, 3 inches, and 4 inches. Each student will copy the drawings in their notebook and the teacher will move about the room to work with students individually. The teacher will ask questions about the drawings and have students answer them. The projection will be kept on the front wall for reference.

The teacher will then set up the TI calculator with the projector and with the wall chart of the calculator introduce it. We will write the formula for surface area of a cube in terms of  $x$ . This will be done with class participation as a review of earlier discussion. Next we will recall the formula for the volume of a cube and enter it into the calculator in a proportion of surface area to volume.

Using the calculator, we will find a table of the values of  $x$  and  $y$  as  $x$  increases from 1 – 10. We will discuss the impact of the changing values of  $x$  on the volume. The students will construct a graph using the calculator for the values of  $x$  and  $y$ . This segment will take approximately thirty minutes of the class period.

The remainder of the period will be spent by having the students writing the equations for 5 values of  $x$  that have not been used during the class thus far. They are to use the calculator to make the calculations and the table and the graphs. This will be handed in at the end of the class.

## RUBRIC

<b>Category</b>	<b>Target</b>	<b>Acceptable</b>	<b>Unacceptable</b>	<b>Point Values</b> (0 to 5- best)
Computer GSP	Access to and use of GSP			
Drawing	Model is clear and neat			
Drawing Scale	Measurements are accurate			
TI 84 Calculator	Use of TI 84 calculator and functions			
Procedure and descriptions	Science concept well described			
Conclusions	Tells how the modeling helped student to understand the problem			

