LAB
Surface Area to Volume Ratio
Modeling a Cell by Building Boxes

INTRODUCTION

Cells are limited in how large they can be. This is because the surface area and volume ratio does not stay the same as their size increases. When a cell becomes larger, the need for nutrients increases and the cell excretes more waste. However, it is harder for a cell to pass materials in and out of the cell membrane, and to move materials throughout the cytoplasm of the cell.

In this lab, you will make cube shaped models to represent cells. The dimension along one side will be doubled for each model. You will then calculate the surface area, volume and ratio for surface area and volume.

MATERIALS
Scissors
Colored Pencils
Metric Ruler
Tape

CALCULATIONS
Surface area = (length x width) x 6 sides
Volume = length X width x height

Ratio = $\dfrac{\text{Surface area}}{\text{volume}}$

PROCEDURE
1. Color the paper models of the cells.
2. Cut out the paper models, making sure to keep the tabs on the outside to assist with folding. Construct five cell models by folding up each side and make a cube (note one side is missing). Use the tabs to fold on the inside of each of the sides. Use tape to hold the sides together.
3. Record the dimensions in the data table below. The dimensions of a side will double each time, with the sides being (1 cm, 2 cm, 3 cm, 4 cm and 8 cm).
4. Make all of the appropriate calculations for each cube, using the equations above. Record all values in the Data Table below; the first one is done for you.
5. Answer the questions on the back of the paper.
6. Stack your cubes together, make sure your name is on each one of them.

	DATA TABLE: CELL SIZE COMPARISON			
Cell #	**Dimensions** (cm)	**Surface Area** (cm²)	**Volume** (cm³)	**Ratio** (Surface Area:Volume)
1	1 x 1 x 1	(1 x 1) x 6 = 6	1 x 1 x 1 = 1	6:1
2				
3				
4				
5				