Name: _____ Date: _____ Period: _____

Honors Biology Cell Size Lab

What determines the upper and lower limits to the size of a cell?

Standard: 3.3.10.A2: Explain the relationship between structure and function at the molecular and cellular levels
Standard: 3.3.10.B2: Identify the specialized structures and regions of the cell and the functions of each.

1. **On your own…**Read section 4.2 p. 54
2. Define:
    - Surface Area:
    - Volume:
    - Ratio:
3. How could we calculate a surface area to volume ratio?
4. Using paper templates, create 3 “cube cell models” of different dimensions. Using these models, fill-in the chart below:

CELL MODEL	Length (cm)	Width (cm)	Height (cm)	TOTAL Surface Area (cm^2) = L x W x 6	TOTAL Volume (cm^3) = L x W x H	Surface Area to Volume Ratio
1						
2						
3						

5. If you were a cell, what part of you is represented by “surface area”?

6. If you were a cell, what part of you is represented by “volume”?

7. If you were a cell, would it be better to have a smaller or larger surface area to volume ratio? Why?

How Could We Prove This…?

8. Summarize the experiment:

9. Data Table:

CELL MODEL	Total Diffusion Distance (cm) (Sum of opposite sides)	Subtract the Diffusion Distance from the Cell’s Dimensions			Volume of Cell Model NOT Affected by Diffusion (cm^3)
		Length - Diffusion Distance (cm)	Width - Diffusion Distance (cm)	Height - Diffusion Distance (cm)	
1					
2					
3					

10. Did diffusion occur during this lab? What diffused? What would this represent in a real cell?

11. Calculate the *rate of diffusion* for each of the cubes (distance/time)

12. Does the size of the cell affect the rate of diffusion? (Use data to support your answer)

13. How might diffusion act as a means of limiting cell size?

14. How would a thin, flat cell (like a pancake) compare to the cube-shaped cell used in this lab in terms of diffusion? Why?

15. Why do large organisms (like humans) need a circulatory system, if all of our individual cells are small?