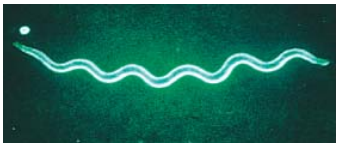
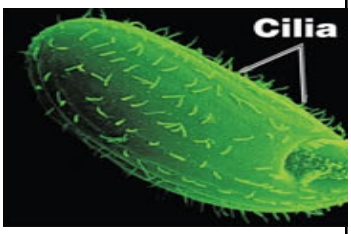
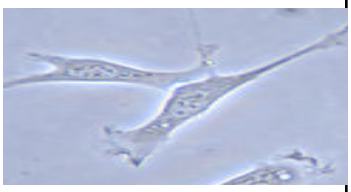
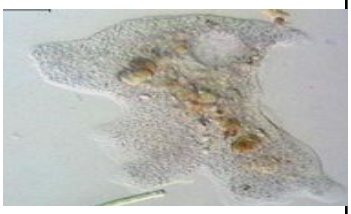
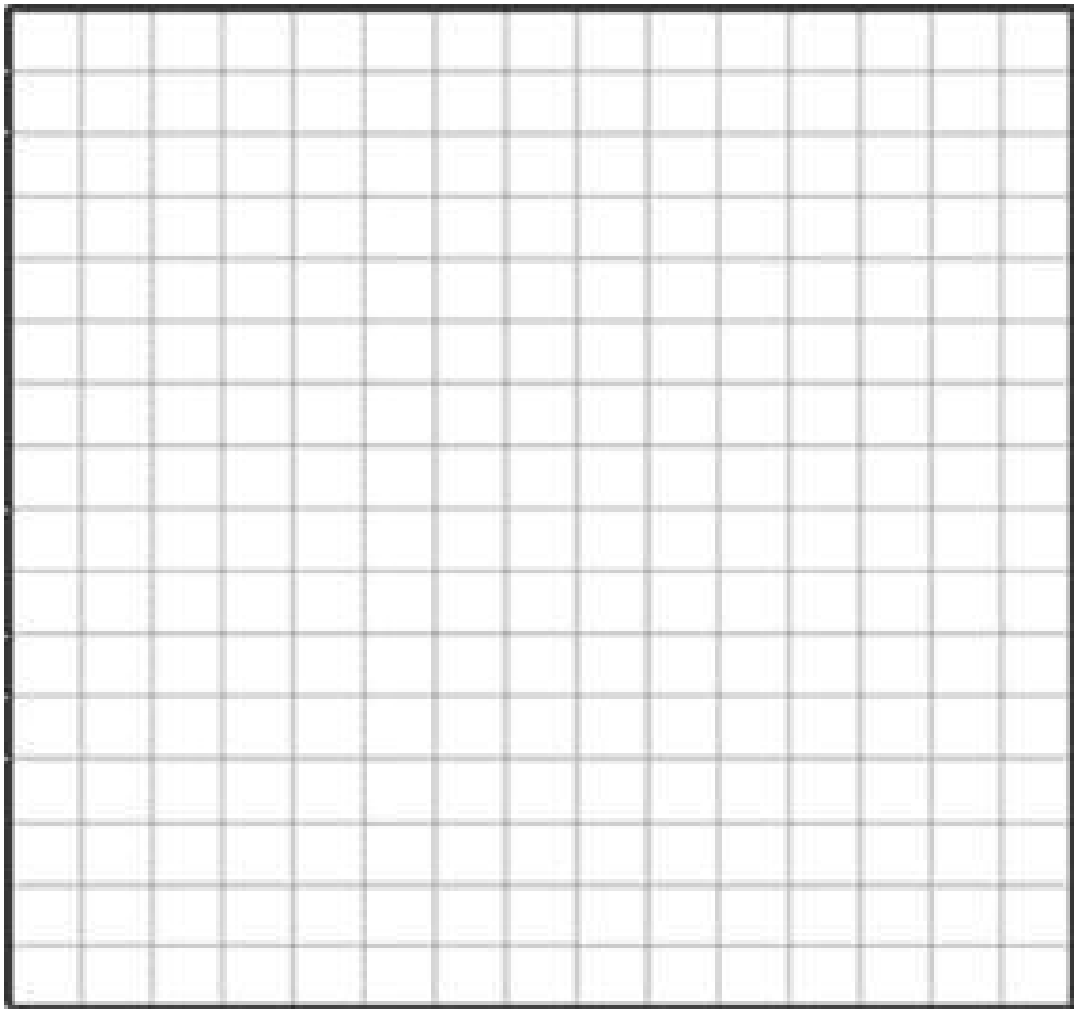
Cell Sizes

1. Below are the maximum length of different cells. Pretend each cell is a cube. Calculate the volume, surface area, and surface area/volume for each.

	Prokaryotic	**Size (μm)**	**Surface Area $=6s^2$**	**Volume $=s^3$**	**SA/V =SA/V**
		1.3			
		1.0			
		2.2			
		5.4			
		**23.5**			
Mean					

	Eukaryotic	Size (µm)	Surface Area $=6s^2$	Volume $=s^3$	SA/V =SA/V
		32			
		123			
		88			
		242			
		7.8			
Mean					

2. On the axes provided, *create* an appropriately labeled graph to illustrate the sample means of the prokaryotic and eukaryotic cells.



3. According to your graph, what is the difference between prokaryotic and eukaryotic cell?

4. Why are cells small?

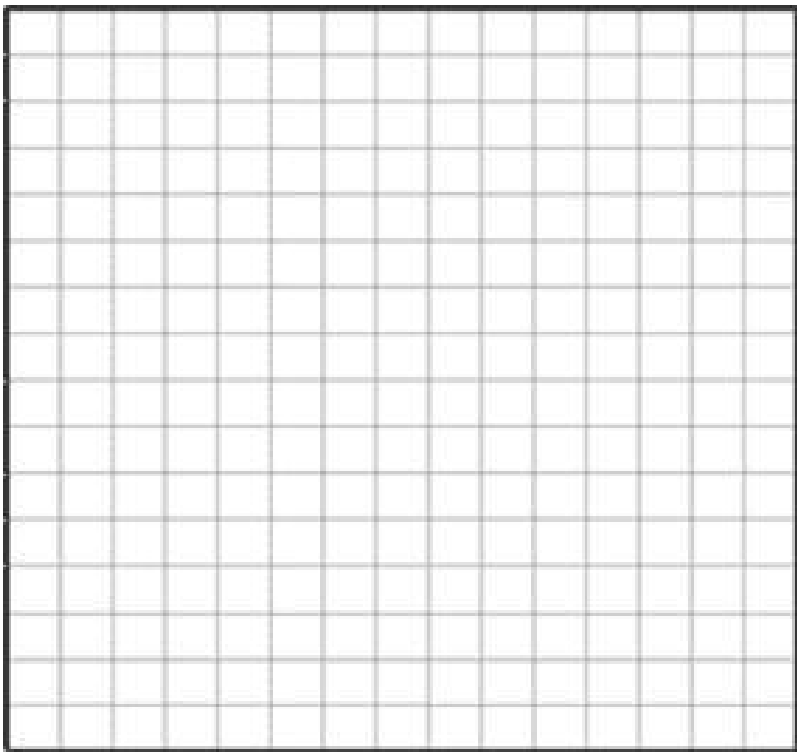
Test the null hypothesis: The surface area per volume of a sample of prokaryotic cells are not statistically significantly larger than a sample of eukaryotic cells to the 95% confidence interval.

Assume that all of the cells above are cubes. Complete the chart below.

	Prokaryotic Cells (diameter in μm)	**Eukaryotic Cells (diameter in μm)**
	1.3	**32**
	1.0	**123**
	2.2	**88**
	5.4	**242**
	23.5	**7.8**
Mean Surface Area (μm^2)		
Mean Volume (μm^3)		
Mean Surface Area/Volume Ratio (μm^{-1})		
Standard Deviation		
1 SEM		
2 SEM		

Use this spreadsheet to save time! - Make a copy to edit to your liking.

5. On the axes provided, *create* an appropriately labeled graph to illustrate the sample means of the SA/V for the prokaryotic and eukaryotic cells to within 95% confidence (i.e., sample mean ± 2 SEM).



6. According to your graph, is there a statistically significant difference between the surface area per volume of prokaryotic cells and eukaryotic cells? Should you reject the null hypothesis?

Images from: http://classes.midlandstech.edu/carterp/courses/bio225/chap04/lecture1.htm