Name: _____ Date: _____ Period: _____

Surface Area to Volume in Cells Week #: _____

Directions: Think about the scenarios in questions 1-3 and predict the answer to each question.

1. You place a gallon of ice cream and a scoop of ice cream next to each other on the kitchen counter. Which one do you think will melt faster? Explain your answer.

 vs. 

_____

_____

_____

2. You want to cool off your drink quickly. Should you place one large ice cube in the drink, or many small ice cubes in the drink? Explain your answer.

 vs. 

_____

_____

_____

3. You buy cake mix and follow the directions for making a cake. Instead of putting the batter into a cake pan, you decide to make cupcakes. If you follow the cake directions to bake for 45 minutes, what do you think will be the result when the cupcakes come out of the oven? Explain your answer.

 vs. 

_____

_____

_____

Directions: Read and annotate the passage below. Then answer the questions below.

Cells have microscopic lives that involve growing, dividing, acquiring nourishment, and excreting waste. These processes are influenced by **surface area to volume relationships.** A cell has a size limit due to the fact that at some point it would get too large to complete these processes. The surface area of the cell membrane must be great enough to provide nutrients to the organelles within the cell's volume in order to keep the cell healthy. If the cell did not keep this ratio, it would soon be unable to efficiently exchange materials and the cell would die.

4. (RST. 9-10.2.) What cellular processes are influenced by their size?

_____

_____

5. (RST. 9-10.2.) Why do cells need to maintain a large surface area to volume ratio?

_____

_____

Name: _____ Date: _____ Period: _____

Directions: Examine Figure 1 and Figure 2 to complete the calculations in Figure 3.

Measurement	Equation
Surface Area	= L x W x (# of sides)
Volume	= L x W x H
Surface Area: Volume Ratio	= SA/V

Figure 1

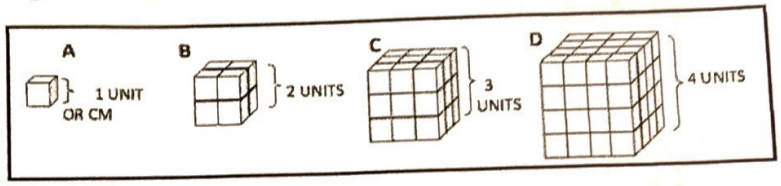

Figure 2

Figure	Length of 1 Side	Surface Area (cm^2)	Volume (cm^3)	SA to V Ratio (cm^{-1})
A				
B				
C				
D				

Figure 3

6. What happened to the surface area as the size of the cube increased? _____

7. What happened to the volume as the size of the cube increased? _____

8. What happened to the surface area to volume ratio as the size of the cube increased? _____

Activity Summary:

9. Figure A represents the most efficient cell. Therefore, similar to Figure A, all cells need to have a _____ surface area to volume ratio. According to the calculations, Cube A had a surface area to volume ratio of _____, which was greater than the larger cubes. The data shows that the larger the cube, the _____ the surface area to volume ratio. There is a maximum possible cell size, above which, the needs of the cell exceeds its capabilities.

Directions: Review your responses to questions 1-3. Explain why each of the following statements are true. You must include the phrase "surface area to volume ratio" in each response.

10. The scoop of ice cream will melt faster than the gallon of ice cream.

_____

_____

11. The small ice cubes will cool the drink off faster than the one large ice cube.

_____

_____

12. The cupcakes that were baked for 45 minutes will burn.

_____

_____