**Activity: Making Sense out of Surface Area to Volume Ratios**

**Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part I: Sensing Surface Area to Volume Ratios**

Examine the candies of different sizes. Feel free to use the knife and cut them open.

1. Assume the candy is a model of a cell. What part of the cell would be represented by the candy coating? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What part of the cell would be represented by the filling? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. By examining the candies, which size candy seems to have the most coating relative to filling? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Assume you prefer to eat more coating than filling. If you had the same amount of candy (about 40 grams), which size would you rather eat – many minis or 1 large? If you have no allergies to the candy, feel free to eat each size to test your suspicion.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Circle the measure that would best quantify the exterior coating of the candy/cell?

Area or Volume

1. Circle the measure that would best quantify the interior filling of the candy/cell?

Area or Volume

1. Circle which candies/cells have a larger exterior coating or surface area relative to the volume of their filling?

Mini sizes or Large sizes





**Part II: Calculating Surface Area to Volume Ratios**

$A=4πr^{2}$$V=\frac{4}{3}πr^{2}$

1. Assuming the cells are spherical, calculate the area of the plasma membrane for 2 cells.

Cell 1 with a radius of 0.1: A = \_\_\_\_

Cell 2 with a radius of 1: A = \_\_\_\_

r=0.1

r=1

**Cell 1 Cell 2**

1. Calculate the interior volumes for both cells.

Cell 1: V = \_\_\_\_

Cell 2: V = \_\_\_\_

1. Calculate the ratio of the surface area to volume for each cell.

Cell 1: A:V = \_\_\_\_

Cell 2: A:V = \_\_\_\_

1. Given your results, which cells have a greater surface area:volume large cells or smaller cells?

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1. Given this, if you were a unicellular organism, would it be advantageous to be a small cell or a larger cell? Why?

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1. Why are larger organisms composed of many cells?

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