**Shape and SA/V Activity**

**Introduction**

The surface area (SA) of a 3-dimensional shape is the sum of the areas of all of its faces. In other words, surface area would be the amount of paper it would take to wrap up that entire object. The volume (V) of a 3-dimensional shape is the amount of space within it or the amount of clay it would take to make that shape. The surface-area-to-volume ratio (SA/V) is the amount of surface a structure has relative to the size of that structure. It can be found by dividing the surface area of an object by the volume of that object.

In this activity you will explore how surface area, volume and shape affect the surface-area-to-volume ratio.

**Materials**

* Metric Rulers
* Playdoh
* Scientific Calculators/Computer

**Procedure**

1. Pick a number between 1 and 10. Consider a cube with a side length of that many centimeters (cm). Using Excel, calculate the volume and surface area.
2. Divide the side length by 10 and recalculate the surface area. Repeat a total of 5 times.
3. For each of these sizes of cubes, find the **surface area to volume ratio** by dividing the surface area by the volume. Which cubes have the biggest ratio?
4. Graph the relationship between volume and length/radius and surface area and length/radius and compare. Also graph the relationship between the SA/V and length/radius of the object. If you forget how to do this, Google it, ask a neighbor, or ask me. Be prepared to explain what this graph shows!

*Extension Activity:*

Using the same shape with the same initial dimensions, calculate the surface area. Keeping the total volume the same, divide the shape into smaller segments and recalculate the combined surface area of all the segments each time. Repeat a total of 5 times. Graph the same variables as above.

\*\*\*The Playdoh can be used to help you better visualize the 3-D object and what happens when you divide it into smaller segments.

**Questions to Consider**

**Instructions:** Complete. You will turn this in!

1. Do you observe a trend in how the surface-area-to-volume ratio changes as the length/radius of the object changes? Explain.
2. How does the surface area change in relation to the volume of the shape?

1. Does the surface area and volume change at the same rate?

1. What type/s of graph/s did you choose? Why?
2. Think about a St. Bernard, a really big dog, and a Pomeranian, a really small dog. Which dog gives you more fur per pound? How does this relate to Surface Area to Volume ratio?