Using Volume to Solve Problems   Name: _____ A#____

Part One: For optimal crust-browning and perfectly cooked filling, a pie with a relatively high surface-area-to-volume ratio is best. A spherical pie would brown before the center is done cooking, whereas the thinner layer of filling in a pizza-shaped pie cooks too quickly. There is a reason we use pie tins, but which is best? **Calculate the volume and surface area for pies created in the following pie dishes. Then explain which one will make the best pie, and why?**

Formula for Volume and Surface Area of Truncated Cone:

$\begin{array}{c} a = radius\ of\ the\ top\ circle \\ b = radius\ of\ the\ base\ circle \\ h = height \end{array}$	$V = \dfrac{\pi h(a^2 + ab + b^2)}{3}$	$Lateral\ Surface\ Area = \pi(a+b)\sqrt{(b-a)^2 + h^2}$ This excludes the circles on the top and bottom, but you know how to find those!

Pie Dish #1: The Standard Base Diameter: 8 inches Top Diameter: 9 inches Height: 1.25 inches	Pie Dish #2: The Deep Dish Base Diameter: 8 inches Top Diameter: 9 inches Height: 2 inches	Pie Dish #3: Grandma's Base Diameter: 9 inches Top Diameter: 10.25 inches Height: 1.5 inches

Part Two: How dense is the filling?

Density Formula

$$p = \frac{m}{V}$$

$p = density;\ m = mass;\ V = Volume$

1) A pie recipe calls for 1kg of Granny Smith apples. The density of Granny Smith apples is 0.24 grams per centimeter cubed. Find the volume of the pie filling that they Granny Smith apples will take up.

2) An ice cream pie calls for 2 pints of your choice of ice cream [1 pint is approximately 473.176475 cm³]. You know you want cookies and cream, but when you get to the store there are two options: Cookies and Cream Light and Cookies and Cream Rich. The density of light ice cream is 0.56 grams per centimeter cubed and the density of rich ice cream is 0.62 grams per centimeter cubed. How much of a weight difference would there be in your pie if you chose the rich ice cream instead of the light?

Part Three: Below are the costs and dimensions of pumpkin pies from three different stores. Determine which pie gets you the most bang for your buck. Show your mathematical calculations and explain your reasoning.

Kroger:	Harris Teeter:	Walmart:
Bakery Fresh Goodness Homestyle Pumpkin Pie	HT Fresh Foods Market Pumpkin Pie	
Base Diameter: 7.5 inches	Base Diameter: 8 inches	Base Diameter: 9 inches
Top Diameter: 8 inches	Top Diameter: 9 inches	Top Diameter: 10 inches
Height: 1.25 inches	Height: 1.5 inches	Height: 1 inch
Price: $5.53	Price: $6.99	Price: $6.50