Lesson Plan

Grade 9 Academic **Lesson: 7 - 12**

Unit/Chapter: 2D Properties and Measurement **Topic: Optimizing Surface Area and Volume**

- ***homework check:*** **NPM 9 p. 470 # 3, 5 – 9, 11, 13, 14**

- ***note:*** **Optimizing Surface Area and Volume**

Investigating optimum measurements usually involves formulas, charts, and graphs. Formulas specific to the measurements given are needed and used to find the missing dimension. Sometimes, several calculations and charts must be constructed to find the optimum measurement. We may have to rearrange formulas for the measurement needed using provided information.

Rearranging formulas may be needed at any time. For example, if we know that the shape that maximizes the volume of a rectangular prism, find a formula that would minimize that same perimeter. For instance,

$SA_{prism} = 2LW + 2WH + 2LH$

$if\ \ L = W = H = x, then$

$SA = 2x^2 + 2x^2 + 2x^2$

$SA = 6x^2$

This formula would be used anytime we are asked to minimize the surface area of a rectangular prism. This would also mean that the volume of a prism that is maximized would be $V = x^3$ and likewise, we could apply these same principles to a cylinder. The cylinder that is most 'cube-like' has a relationship of height equal to diameter, or $h = d = 2r$. If we use this relationship to find some formulas, we get:

$SA = 2\pi r^2 + 2\pi rh$

$but\ h = 2r$

$SA = 2\pi r^2 + 2\pi r(2r)$

$SA = 2\pi r^2 + 4\pi r^2$

$SA = 6\pi r^2$

and

$V = \pi r^2 h$

$but\ h = 2r$

$V = \pi r^2 (2r)$

$V = 2\pi r^3$

These formulas can be used anytime we are asked to minimize or maximize the dimensions of a cylinder.

- ***Homework:*** **NPM 9 p.480 # 2 – 14 evens**