

MPM1D – Aly  
7.2 Optimization Conclusions

Name: \_\_\_\_\_

OPTIMAL VALUE OF MEASUREMENTS IN 2D:

- A **rectangle** that will minimize perimeter and maximize area is a \_\_\_\_\_.

Optimized Formulas:  $A =$   $P =$



- For a rectangular shape with perimeter only along three sides, the dimensions that produce the optimal measurements are



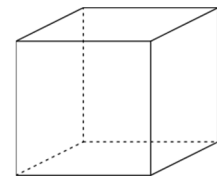
OPTIMAL VALUE OF MEASUREMENTS IN 3D:

**Rectangular Prisms:**

The rectangular prism that will minimize surface area and maximize volume is a \_\_\_\_\_.

$$V = lwh$$

$$SA = 2(lw + lh + wh)$$



Optimized Formulas:  $V =$   $SA =$

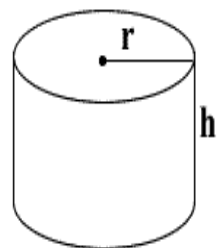
**Cylinders:**

The cylinder that will minimize surface area and maximize volume has the following dimensions:

$$\underline{\hspace{1cm}} = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$V = \pi r^2 h$$

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



Optimized Formulas:  $V =$   $SA =$

Ex1. Determine the dimensions of a rectangular prism with a volume of  $500\text{m}^3$  that minimizes surface area.

Ex2. A rectangular prism has a surface area of  $400\text{m}^2$ . What is the maximum volume it can hold?

Ex3. A cylinder has a volume of  $50\text{m}^3$ . What is the minimum surface area needed?

Ex4. Prove which 3D shape gives the minimum surface area given a volume of  $1000\text{m}^3$ , a cube, cylinder or a sphere? Show your work.