

**EDUCATIONAL ASSIGNMENT for JOSEPH JOHN WUNDERLICH for 11th grade**

This assignment covers the following Educational Objectives (Subjects marked with a "■" are the main subject, and those marked with an "□" are secondary subjects):

■ Geometry

**Solve the following problems. Put all your work directly on this assignment and try not to use a calculator. You may look up equations. Draw a picture for each problem. Use a pencil. Include the proper units in your answers.**

1. For a rectilinear **PYRAMID** shape of height  $h = 4m$ :

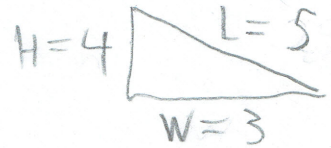
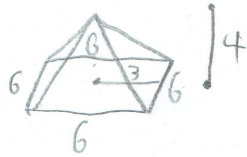
a. What is the **Volume** if the Base  $B = 36m^2$  (i.e. B is its "foot-print")

$$V = \frac{1}{3} B \cdot h$$

$$V = \frac{1}{3} 36 \cdot 4 \quad \boxed{V = 48m^3}$$

b. What is the **Linear Area (L.A.)** (i.e. the Area of its Walls) if the Base  $B = 36m^2$  (Use Pythagorean Theorem)

$$LA = \frac{1}{2} l \cdot p$$



$$LA = \frac{1}{2} 5 \cdot 24$$

$$LA = 2\frac{1}{2} \cdot 24$$

$$\boxed{LA = 60m^2}$$

$$L^2 = h^2 + w^2$$

$$L^2 = 4^2 + 3^2$$

$$L^2 = 16 + 9 = 25$$

$$L^2 = 25$$

$$L = 5$$

c. What is the **Surface Area** if the Base  $B = 36m^2$

$$SA = LA + B \quad SA = 60 + 36 = \boxed{96m^2}$$

d. What is the Ratio (S.A.)/(V) of the **Surface Area** to the **Volume** if the Base  $B = 36m^2$

$$SA = \frac{96m^2}{V = 48m^3} \div 12 = \frac{8m^2}{4m^3} = \boxed{\frac{2m^2}{1m^3}}$$

e. Research the meaning of "**Envelope Dominated**" (ED) and "**Interior Dominated**" (ID) buildings and define them here:

ED: Envelope dominated buildings tend to have a greater surface area to volume ratio, making them harder to heat and cool because of their smaller size and greater number of exterior-facing walls spread out.

ID: Interior dominated buildings on the other hand are much more compact and have a lower surface area to volume ratio. With more rooms to trap air of a desired temperature inside these buildings are cheaper to heat and cool on a square footage basis though are normally larger such as office buildings or theaters.

2. Describe in words (handwritten in pencil) any **TWO pyramid shaped structures** that you have learned about in College, and describe why you believe they were great Architectural accomplishments to complete at the time they were built. Don't forget to state **names, dates, locations, materials used, and Architect (if known)**

One great pyramidal structure is the stepped Pyramid in Saqqara, Egypt. Built around 2611 B.C.E out of limestone under the instruction of the architect Imhotep. Not being a smoother pyramid like most others, the large steps would prove to be incredibly difficult to lift the stone bricks up to.

Another famous building is the Pyramid of the Sun in Teotihuacan, Mexico. This is more of a ziggurat than a pyramid due to the flat top and stepped layers. The core is made of earth like a mountain, but with a stone brick veneer.