

## Lab Framework

**Text:Geometry**

**Unit number and title: Units 7 & 8 (2D & 3D Wooden Shapes)**

**Developed by: Ken**

**Date: Summer**

### Lab Title

**Contact Information:** (kritter@mtadams.wednet.edu)

**Short Description:** In this lab the students will use four geometric 3D shapes (three prisms and a cylinder) to draw out and calculate their total surface areas and their volume.

### LAB PLAN

**TEACHER:** Teacher Prep/ Lesson Plan

- **Lab Objective**

The students will use four geometric 3D solid shapes (three prisms and a cylinder) to draw out and calculate their total surface areas and their volume.

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)

Students need to know the formulas and methods used to calculate the area and perimeter of rectangle, square, circle, trapizoid, and triangle taught in Unit 7.

- **New Vocabulary**

Base, Capacity, Cube, Cylinder, Lateral Surface Area, Rectangular Solid, Total Surface Area (TSA), and Volume

- **Materials List**

A plastic bag with 4 geometric shapes  
Calculator  
Ruler with mm and cm units

- **GLEs addressed**

Math: M0801 Identify cylinders, rectangular solids, cones, and spheres.

M0802 Calculate surface area and volume for cylinders, rectangular solids, cones, and spheres.

M0803 Solve problems that involve cylinders, rectangular solids, cones, and spheres.

Reading: 2.3 Expand comprehension by analyzing, interpreting, and synthesizing information and ideas in literary and informational text.

2.3.2 Evaluate informational materials, including electronic sources, for effectiveness.

2.3.3 Evaluate the use of literary devices to enhance comprehension. W

2.3.4 Synthesize information from a variety of sources.

Writing: 2.2. Write for different purposes, such as telling stories, presenting analytical responses to literature, persuading, conveying technical information, completing a team project, and explaining concepts and procedures.

- **Leadership Skills**

**1.4 the student will be involved in activities that require apply theory, problem solving, and using creative thinking skills while understanding outcomes of related decisions.**

- **SCAN Skills**

Arithmetic - Perform basic calculation of volume and surface area that applies to 5 3D geometric shapes.

Writing - Perform basic writing skills of diagrams that obtain the volumes and surface area for five 3D geometric shapes.

- **Set-up information**

Have six bags for the four 3D geometric shapes ready to hand out to the class.

Calculators are needed for each student

Rulers with mm and cm units are needed for measurements.

- **Lab organization** (-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required**)

Students should be organized into groups of 3 or 4 students. Each student will be responsible for recording and calculating the volumes and surface areas for five 3D shapes.

- **Teacher Assessment of student learning** (scoring guide, rubric)

	1	2	3	4
Shapes Three Prisms and Cylinder	Drawing Only	Drawing + Dimensions	Drawing + Dimensions + Correct Area	Drawing + Dimensions + Correct Area + Correct Volume

- **Summary of learning** (to be finished after student completes lab)

-discuss real world application of learning from lab

-opportunity for students to share/present learning

There are many real world applications for volumes and surface areas for these four 3D geometric shapes. (Example: Air conditioning repairmen need to know the volume of a home in order to place a heater or air conditioner that will perform properly.)

- **Optional activities**

These same shapes can be used to answer questions about number edges, vertices, faces etc.

- **Career Applications**

Agriculture - determining the amount of tin siding you need to order for a barn. Carpentry – roofing plywood sheets necessary to cover the roof. Home Economics – determine the amount of material needed to cover a chair or make a dress.

## LAB TITLE: Units 7 & 8 (2D & 3D Wooden Shapes)

### STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**

The students will use four geometric 3D solid shapes (four prisms and a cylinder) to draw out and calculate their total surface areas and their volume.

- **Grouping instructions and roles**

Students should be organized into groups of 3 or 4 students. Each student will be responsible for recording and calculating the volumes and surface areas for five 3D shapes.

- **Procedures** – steps to follow/instructions

1. Each group member will select a 3D geometric shape from the bag of shapes.
2. On a piece of white paper place the shape in the middle the page and trace around it. (See the example of the trapezoid on the screen.)
3. Keep folding the shape until you have traced around all the sides. Remember to keep the sides touching each other. The student that has the cylinder will need to roll the cylinder once to make a rectangle for its sides.
4. Use a ruler and measure the dimensions of the sides. (cm)
5. Calculate the area for each side of your shape.
6. Make a table with the names of your shape's side and its matching area you calculated.
7. Then find the TSA (Total Surface Area) for you shape.
8. Calculate the volume for your shape.
9. Trade shapes with a partner and repeat steps 1-7.

- **Outcome instructions**

Each group is to come up with its own group average for the TSA and Volume for the five shapes.

- **Assessment instructions** (peer-teacher)

**Student is to rate their drawing of the five shapes as 1,2,3,or 4.**

Shapes	1	2	3	4
Three Prisms and Cylinder	Drawing Only	Drawing + Dimensions	Drawing + Dimensions + Correct Area	Drawing + Dimensions + Correct Area + Correct Volume

**Lab Data Collection**  
**3D Wooden Shapes**

**Student:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Units: 7 & 8**

**Lab Title: 3D Wooden Shapes**

**Criteria: Write the problem/objective in statement form**

Each student is to take a 3D shape, draw it out in a 2D form, measure and label the sides dimensions (in cm's), and then calculate the TSA and Volume

**Data Collection: Record the collected/given data**

Calculations	Rectangular Prism	Triangular Prism	Trapezoidal Prism	Cylinder
TTA (Total Surface Areas)				
Volume = (Area Base)x (Height)				

**Calculations: Complete the given calculations to solve for an answer(s)**

Compute your shapes' TSA and Volume and put it on the table above.

**Summary Statement:**

Summarize by explaining which of the four shapes has the greatest TSA with the least amount of volume. In the real world why might that fact be important to a candy maker M&M or Star Burst?

**Other Assessment(s)**

Explain what two shapes could be combined to make a trapezoidal prism.