

Lab 3: Density

Name: **Your Name**

Class: **PHYS 2125 (15921)**

Date: **2025-01-31**

Objective

To determine the masses of different objects using density method.

Equipment

- (1) aluminum cylinder
- (1) brass cylinder
- (1) aluminum block (rectangular cuboid)
- (1) brass block (rectangular cuboid)
- (1) vernier calipers

Theory

The density, d , mass, m , and volume, V , of an object are related as follows.

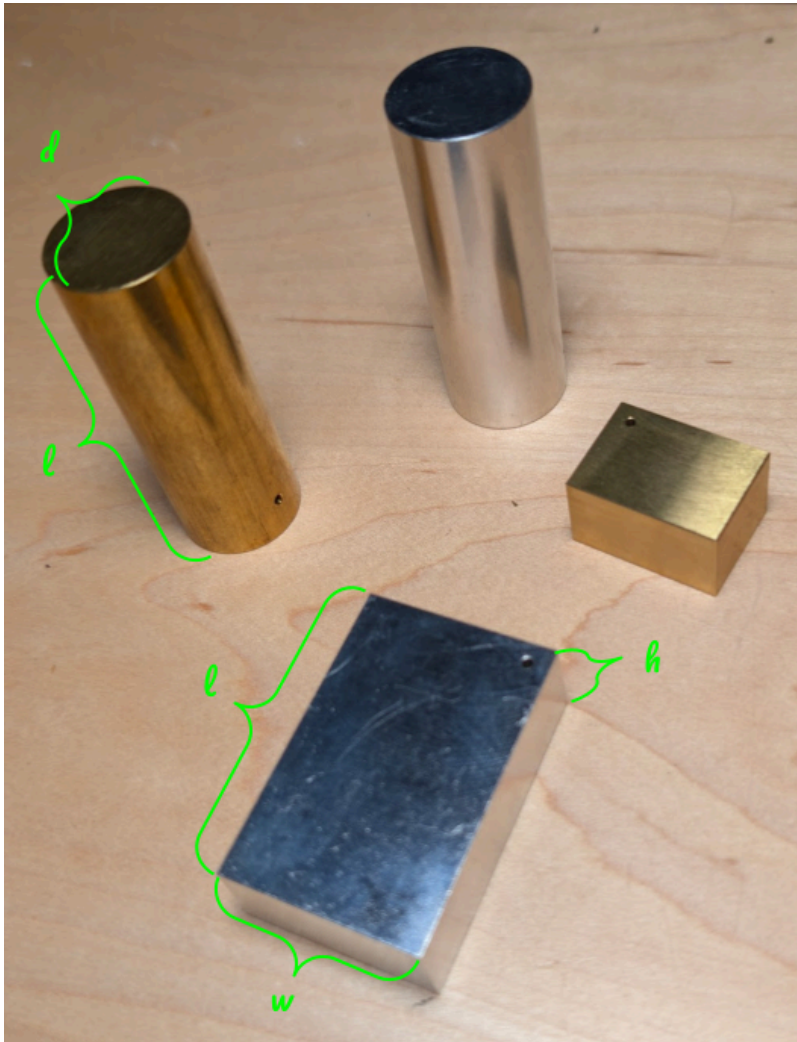
$$\text{Density } (\rho) = \frac{\text{mass } (m)}{\text{volume } (V)}$$

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

$$m = \rho \times V$$

The volume, V , of a cylinder can be calculated as $V = \pi r^2 \times h$

The volume, V , of a rectangular cuboid can be calculated as $V = l \times w \times h$



Procedure

- 1. For each object critical dimensions were taken.
 - A. For the cylinder the diameter, d , and height, h , were measured.
 - B. For the blocks the length, l , width, w , and height, h , were measured.
- 2. The volume, V , was calculated using the measurements taken and the formulas above.
 - A. Of course because we measured the diameter of the cylinders, and not their radius, we had to calculate that value ($r = \frac{d}{2}$).
- 3. With the volume, V , and the known density, ρ , of the materials in question (aluminum and brass), the mass, m was calculated.

Data

	Diameter (meters)	Radius (meters)	Height (meters)	Volume (cubic meters)	Mass (kilograms)
Object					
Aluminum Cylinder	0.0222	0.0111	0.0635	0.000025	0.0662
Brass Cylinder	0.0222	0.0111	0.0635	0.000025	0.2146

	Length (meters)	Width (meters)	Height (meters)	Volume (cubic meters)	Mass (kilograms)
Object					
Aluminum Block	0.0488	0.0318	0.0159	0.000025	0.0665
Brass Block	0.0262	0.0191	0.0157	0.000008	0.0684

Density (kilogram per cubic meter)	
Aluminum	2700
Brass	8730

Discussion

A solid object is made of two materials, one material having density of 2 000 kg/m³ and the other having density of 6 000 kg/m³. If the object contains equal volumes of the materials, what is its average density?

The average density of a material made up of equal volumes of a material with a density of 2000 kg/m³ and 6000 kg/m³ would have a density of 4000 kg/m³.

The standard kilogram is a platinum-iridium cylinder 39.0 mm in height and 39.0 mm in diameter. What is the density of the material in SI units?

The volume of a cylinder with a diameter of 39.0mm and a height of 39.0mm would have a volume of 46589.0mm³ and therefore a density of 21464.3 kg/m³.